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THE CANADIAN

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VOLUME XIX.

EDITED BY THE

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PORT HOPE, ONT.

ASSISTED BY

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AN EXPLANATION.

BY WM. SAUNDERS, LONDON, ONT.

A protracted absence from home has prevented me from offering earlier to the readers of THE CANADIAN ENTOMOLOGIST an explanation of the circumstances which have led to my resignation of the post I have held so long as Editor of this journal. For thirteen years it has been my pleasure and privilege to be thus brought in contact with most of the active workers in the Entomological field, with many of whom I have held pleasant intercourse both by correspondence and in person, and it occasioned me much regret when I found it necessary to sever my connection with those editorial duties which had hitherto given me so much pleasure. Shortly after the proposal was made that the Government should establish a number of experimental farms in Canada, I was employed to collect such information as might aid in determining the best course to pursue. This enquiry resulted in my becoming greatly interested in the work, and subsequently in my accepting the position of Director of the same. The duties of this office are so weighty and constant as to make it necessary for me to give up all other engagements and devote to it my entire time and thought. Since Economic Entomology is one of the subjects which will claim attention at the principal or central farm, I hope still to be able, if not directly, at least indirectly, to aid in advancing this important branch of Entomological study. I desire to tender my sincere thanks to the many kind friends who have aided me in the past by supplying useful matter for the journal, and would bespeak for my esteemed and able successor a continuance of that confidence and support. Our readers may rest assured that my withdrawal from the editorial chair will not in any way lessen the value and usefulness of THE CANADIAN ENTOMOLOGIST; indeed, I have reason to believe that, under the skilful management of the newly appointed Editor, the Rev. C. J. S. Bethune, the future of our valued monthly will in many respects be an improvement on the past.

NOTE ON THE EUROPEAN GRAPTA C ALBUM.

BY W. H. EDWARDS, COALBURGH, W. VA.

In the Entom. Mo. Mag., xxiii., p. 186, Jan., 1887, is the statement by Mrs. Hutchinson, of Leominster, to this effect: that the writer caught a female *C Album* which was hovering about currant bushes, and obtained from her many eggs, laid between 27th April and 6th May. The eggs hatched between May 5th and 11th, and the larvæ were full grown from 17th to 23rd June. The first butterfly came from pupa 26th June, the last 3rd July. "*Two of the insects paired on June 30th, and the female commenced laying on 1st July*, and continued doing so until the 10th, when there were 120 ova in all." (Neither one of this pair then could have more than four days out). From these eggs butterflies were obtained, from 17th to 27th August. "Several pairs were put together, but no ova were obtained." I do not know whether this last means that actual copulation took place or not, but should suppose not, as eggs could not have been formed in the ovaries, these butterflies being of the last brood of the year, and the one which hibernates.

The interesting point in this narrative is that butterflies will pair in captivity. I myself have never known such an instance, but in CAN. ENT., xviii., p. 17, it is recorded that a pair of Satyrus *Alope* paired when put under a net, as observed by Miss E. L. Morton. Some butterflies come from pupa with eggs mature. I have seen pairs of *P. Ajax* copulating, when the wings of the female were not yet dry. In case of Heliconia *Charitonia*, the pairing often takes place before the female is clear of the pupa skin. Argynnis *Myrina* has been recorded as pairing almost immediately after both sexes left the pupæ. And the eggs of *P. Tharos* are fully formed on coming from chrysalis. On the other hand, many species require 10 or 15 days at the least to mature their eggs, as our larger Argynnids, several Papilios and others. It is well worth while to experiment with different species in this direction.

These observations of Mrs. Hutchinson settle the question as to *C Album* being single or double-brooded. Westwood, in Humphrey's Brit. But., 1846, says the species is double-brooded. But Newman, Brit. But., 1871, p. 50, says that an idea seems prevalent that there are two broods in the year, but that he thinks it is a mistake, and never had satisfactory evidence of it. So that up to 1871, it seems not to have been a settled

question. No book that I have gives any farther information. The "Larvæ of British Butterflies," by the late Wm. Buckler, recently published, says nothing on the point.

There are three American species of Grapta, at least, which correspond to, and represent, *C Album*, namely, *Comma*, *Satyrus* and *Faunus*, and so high authorities as Dr. Staudinger and Mr. Möschler once pronounced all these to be *C Album*. But after figures of the larva of *Comma* were published, 1871, But. N. A., vol. 1, and descriptions of the larva of *Satyrus* by Messrs. H. Edwards and Pearson, it was everywhere conceded that these two were not *C Album*. That was something gained. But many, especially European, authors still hold *Faunus* to be *C Album*. *Faunus* is remarkable for its lack of variability. Examples from all localities are identical in coloration and markings. Whereas *C Album*, if all the phases in color, markings and size, which in Europe pass as *C Album*, be really but one species, a matter which I very much doubt, varies wonderfully, and takes in not only phases like the three American species mentioned, but of three or four others, and some not represented in America. And now comes proof that *C Album* is two-brooded, while it is certain that in no part of its territory is *Faunus* more than single-brooded, although in a considerable part of such territory it flies in company with *Comma*, and apparently the season is as favorable in these districts for two broods in *Faunus* as in *Comma*. *Faunus* is a sub-boreal species, flying from one ocean to the other, but to the southward it also occupies Canada and parts of New England, New York, Pennsylvania, and Virginia, and even to Georgia, in the mountainous sections. And being boreal and one-brooded, it is fair to presume that it came from the north; that at the time, ages ago, when the two continents were united, the species occupied the northern parts of both. When the separation took place, the European branch split into numerous varieties, and became double-brooded, yet retained its identity as one species (that is, if the European lepidopterists of to-day are right in their views), and shows nowhere differences between any of its preparatory stages—one multiform species.

And the other branch, on the western continent, threw off diverse forms, several of which have come to have very different caterpillars from the original type. These also came to be two to four-brooded, and two, at least, became seasonally dimorphic in coloration. But one form, *Faunus*, remains single-brooded, and shows no tendency to vary, and may

be presumed to be nearer to the primeval type of the species than any of the forms that now compose the group. Of course, this one-brooded, non-varying form is to-day not the same thing as the two-brooded, very variable form found in Europe. They have come to be two distinct species. It is unfortunate that even now so little is known of the early stages of *Faunus*. It is a matter that the northern lepidopterists should have studied, and all stages from the egg might easily have been seen and described. There may be important differences between the larvæ and pupæ of *Faunus* and *C Album*.

ADDITIONS TO THE LIST OF CANADIAN LEPIDOPTERA.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

I give the following names in the Geometridæ as new to the Canadian List:—

1. Caberodes majoraria, Guen.
2. Endropia marginata, Minot.
3. " textrinaria, Grote.
4. Ephyra pendulinaria, Guen.
5. Arthena lucata, Guen.
6. " albogilvaria, Morr.
7. Deilinia variolaria, Guen.
8. Semiothisa minorata, Pack.
9. Phasiane mellistrigata, Grote.
10. Thamnonoma brunneata, Thun.
11. Cymatophora umbrosaria, Hub.
12. Heterophleps Harneiata, Pack.
13. Lobophora anguilineata, Grote.
14. " montanata, Pack.
15. Petrophora prunata, Linn.
16. " lunigerata, Walk.

All the common species that were easily obtained in this locality, have had names in my collection for many years, but owing to the changes that were being made in the genera and synonymy of species, I was not in a

position to follow them up, so that when Mr. Grote's "New Check List" appeared, which I have followed in this, I found that several of my old names had disappeared altogether, and others had been rendered doubtful.

The Rev. Geo. D. Hulst, of Brooklyn, N. Y., opened communication with me last fall, with a view to exchange; he also at the same time kindly offered to name anything he could for me. Gladly availing myself of the services of so competent an authority, I sent to him all that I considered doubtful in my collection, as well as the new and unnamed material I had on hand. The result was the correction of several errors, as well as the addition of new species to my list. Nos. 1 and 2 are old specimens. No. 5, one specimen taken last summer. No. 6, quite common here. No. 8, one specimen, last summer's capture. No. 11—my Cymatophoras were badly mixed, and I have some single specimens that yet want determining. No. 12, quite a common insect here, but which I had the pleasure of adding to Mr. Hulst's collection, where it was wanting. No. 15, a single specimen; 16 a single specimen I have had for years, and have not met with another, and have only seen one in any other collection. Mr. Hulst gives it as *Cidaria lunigerata*, var. *dispunctaria* Pack. Of the other numbers, I have received the names from different sources in recent years.

Mr. Hulst also named some that are new to me, but already in the Canadian List. Last summer is generally acknowledged to have been poor in Lepidoptera, yet I was quite fortunate in obtaining new things in the Geometridæ, although so many of them were but single specimens of a kind.

A NEW HOMOHADENA.

BY G. H. FRENCH, CARBONDALE, ILL.

Homohadena Elda, n. sp.

Expanse 1.30 inches. Apex very slightly produced, the posterior angle rounded; eyes naked; palpi oblique, projecting beyond the head in their natural position about the width of the eyes; tibiæ unarmed; abdomen equalling the hind wings; covering of thorax mostly scales. Color, warm gray, slightly wine tinted; basal half line black, not very distinct, strongly angulated outward on the subcostal vein, a black basal dash crossing the lower end of this line, the space enclosed between the costa

and these two lines sordid white; t. a. line black, double, the inner portion sub-obsolete, general course nearly straight, but from the costa to median vein extending slightly inward, and from median to sub-median slightly arcuate outward, as also from sub-median to posterior margin; median shade prominent, smoky black, straight, extending from costa to posterior margin, in width .04 of an inch, a gray spot in the lower end of it, and bordered externally by the internal portion of the black annulus of the reniform, and below median venules by what seems to be a portion of the t. p. line; t. p. line obsolete save some black points between white on the veins and the arcuate black portion before spoken of, bending outward round the reniform and inward below this; sub-terminal line whitish, irregular, faintly sending gray streaks to the margin on the veins. Stigmata large; orbicular elongate transversely to the wing, black annulate with a white shading inside this; reniform kidney-shaped with the outer depression quite prominent, a prominent black border toward base of wing, but none or only slight on the outside, inside this a white bordering that extends round the spot. Outer margin a black line, fringe concolorous with the wing. Hind wings pale smoky gray, nearly uniform, slight indication of a line through the middle, fringe whitish. Thorax gray with the shoulder tufts and posterior scales black tipped. As this covering had been slightly disturbed, could not tell whether these posterior scales formed a low tuft or not, but should think they did. Under side gray, with but faint indication of marks.

Described from two females from Soda Springs, Sishyon Co., California, one in the cabinet of James Behrens, and the other in the cabinet of G. H. French, captured in September, 1885.

NORTH AMERICAN TACHINIDÆ.

GONIA.

BY PROF. S. W. WILLISTON, NEW HAVEN, CT.

The genus *Gonia* is one easily recognized by reason of its peculiar structure of the head and antennæ; unfortunately the separation of species is a much less simple matter. As is so frequently the case, isolated speci-

mens frequently furnish grounds for much more decided opinions than a richer material will sustain. I describe in the present paper five species that present characters sufficiently decisive to render their recognition not doubtful; other species I forbear to name till my material is richer. It will be seen that I make little use of the structure of the arista, a character that has been relied upon much in the European species; but I am satisfied that it is a variable one in individuals of the same species, and is, moreover, distinctly sexual. There is a distinct variation in different species in the position of the anterior cross-vein, as regards the termination of the auxiliary; of how much value the character is I am not yet decided.

Generic characters.—Moderately large species, not very bristly. Head very large, inflated; front very broad, only a little narrower in the male, with numerous, not very strong bristles; face in profile nearly perpendicular, the epistoma but slightly projecting; the oral margin with a row of bristles, not ascending on the edges of the median facial depression. Cheeks broad; bare, or with short bristles. Antennæ elongate; third joint two or three times as long as the second in the female, from four to eight times in the male; arista stout, composed of three joints, the second and third elongate, and joining each other at an angle, as though broken. Eyes bare. Palpi cylindrical. Scutellum with six strong bristles on its border. Abdomen broad oval or ovate; first and second segments each with a pair of median posterior bristles and one extreme lateral posterior one; third segment with a row on the posterior border. No spinule at tip of auxiliary vein; fourth vein obtusely angulated, without stump of vein, terminating in the costa a considerable distance before the tip; posterior cross-vein much nearer the angle than to the anterior cross-vein.

Head yellow, except the occiput, palpi yellow; thorax black, margins of dorsum and scutellum often yellowish; legs black. Larvæ, so far as known, parasitic on hymenoptera and lepidoptera.

Table of Species.

1.—Abdomen wholly black, or at most only somewhat reddish on the sides of base; claws and pulvilli of male small. . FRONTOSA Say.

Abdomen largely or wholly red or yellow. 2

2.—Face and antennæ golden yellow; claws of male small. . SENILIS, n. sp.

Face and antennæ not golden yellow. 3

3.—Sides of face, pleuræ and femora with yellow hair; claws and pulvilli of male small. . . . . PORCA, n sp.

Sides of face with black bristles; pleuræ not with yellow hair.....4
4.—Abdomen reddish yellow, with or without small black spots; claws and pulvilli of male small.....SEQUAX, n. sp.
Abdomen largely black; claws and pulvilli of male large..EXUL, n. sp.

GONIA FRONTOSA Say, J. Acad. Phil. vi., 175; Compl. Wr. ii., 365.
Gonia philadelphica Macquart, Dipt. Exot. ii., 3, 51, 6.
? Gonia albifrons Walker, List, etc., iv., 798.

♀. Length 9.5-10 m.m. Face and front light yellow, with a silvery, or slightly golden sheen; front a little translucent on the sides when seen from above; face on the sides with short black bristles, and a number of longer ones near the sides of the median depression; median depression in its greatest width about as wide as the least width of the sides of the face; cheeks with short black bristly hairs only. Antennæ blackish brown, the second joint and base of third yellowish; second joint about one-third the length of the third; second joint of the arista not more than three-fifths the length of the third. Palpi yellow. Dorsum of thorax black; the humeri, post-alar callosities, and scutellum in large part, luteous yellowish; dorsum, when seen from behind, distinctly gray pollinose, leaving four slender stripes. Bristles of scutellum long, reaching to base of third abdominal segment. Abdomen deep shining black; the second segment with a very narrow, the third with a narrow, the fourth with a moderately broad, basal white-pollinose cross band. Wings nearly hyaline behind; the costal, subcostal and first basal cells very distinctly tinged with brown.

♂. Length 9-10 m.m. Front distinctly narrower, and more projecting below. Median facial depression deeper, larger, and longer, broader below than the sides of the face. Antennæ larger and longer, the second joint shorter, not more than one-fifth or one-sixth as long as the third; arista shorter than the joint, its second joint curved, three-fifths, or three-fourths as long as the third. Dorsum of the thorax a little more hairy. Abdomen more elongate or egg-shaped, the sides of the second and third segments sometimes reddish. Tarsal joints of front feet a little less disciform, the claws a little longer.

This description is drawn from twelve females, mostly collected together in Fairmount Park, Philadelphia, by Mr. E. Keen, and eight males from Minnesota, collected together. They are all closely related, and their absolute identity seems certain. Among these specimens, however,

there is no absolute uniformity in the length of the aristal joints, though not much discrepancy.

All the rest of my specimens, from various localities throughout the United States, are larger, reaching twelve and a half millimetres in length and none of them as small as the largest of the ones described. The pollinose bands of the abdomen are usually broader on the second and third segments, the wings in none so strongly infuscated proximally, and in most the infuscation is more or less obsolete; the antennæ vary from red to black, the second joint of the arista in the female varies from one-third to three-fourths as long as the third joint; in the male from one-half as long to longer. The dorsal thoracic stripes vary from very slender ones in Colorado specimens, to broader and more distinct ones in New England, North Carolina, and Southern Californian ones. Specimens from Carolina and New England have the basal part of the venter yellowish red, with moderately large spots on the sides of the basal segments above. A specimen from Wyoming has the thoracic dorsum strongly pollinose, and the bands of the abdomen unusually broad. Two others from California have the second joint of the arista very short, not a third of the length of the third, the wings scarcely at all infuscated in front, and, unlike all the other specimens, the cheeks do not have black hairs, but yellow pile; other specimens from California, however, are like the eastern ones in this respect. Yet another, rubbed (female) specimen, from Connecticut, differs in having the sides of the face distinctly narrower, considerably narrower than the median portion. The bristly hairs on the sides of the face vary not a little in size; those of the described specimens leave a more bare space below on the inner side, that is less, or not at all, apparent in the larger specimens.

The value of these various characters I confess myself unable to decide. Only this much seems certain, no, or little reliance can be placed upon the comparative lengths of the aristal joints; and the second joint is always longer and more bent in the male than in the female.

I think there can be little doubt but that this is Say's species; his "large, obsolete, reddish brown spot near the base" of the abdomen is not usually, though frequently, present. The synonymy of *G. philadelphica* seems equally certain. The species must be closely allied to, possibly identical with *G. fasciata* Meigen, of Europe, the larvæ of which have been found in nests of *Bombus terrestris* and *Megilla retrusa*, where the flies deposit their eggs. A specimen from the Boston Society of

Natural History, somewhat teneral with red antennæ, bears the label: "From *Pyrrharctia isabella*, Apr. 24."

Altogether, I have examined about seventy-five specimens, from New England, New York, Pennsylvania, North Carolina, Indiana, Minnesota, Montana, Colorado, Wyoming, Northern and Southern California.

GONIA SENILIS, n. sp.

♂. Length 10 m.m. Front and face golden yellow, not very changeable, the vertex on either side sub-translucent when seen from above; sides of the face considerably narrower than the median depression, clothed with short black bristles. Antennæ wholly pure orange-yellow, the tip of arista brownish, second joint very short, third very long, six or eight times longer than the second; second joint of the arista shorter than the third. Thorax not densely pollinose, when seen from behind, with four slender stripes, scutellum luteous at tip only. Abdomen black, the sides broadly red, forming a moderately broad lateral posterior margin to the first and reaching to about the middle of the third segment on the sides; pollinose bands broad. Wings nearly hyaline, anterior cross-vein nearly opposite the middle of the subcostal section of the costa. Claws and pulvilli small.

One specimen, Western Kansas. Although I have but the single specimen, I venture to describe this species. The color of the antennæ seems evidently normal; should it really be darker in other specimens, however, the other characters given will, I believe, render the species recognizable.

GONIA PORCA, n. sp.

♂. Length 13 m.m. Face and front light yellow with a silvery sheen, the front, except in a very oblique light, oily translucent on the sides; sides of the face without the usual short black bristles, except above; the largest part, as also the cheeks, is clothed with long fine hairs or pile; the usual row along the sides of the median depression. Median depression wider than the sides of the face below. Antennæ black, the third joint five or six times longer than the second; second joint of the arista shorter than the third. Dorsum of thorax thinly pollinose, stripes not very distinct; the sides more or less and the scutellum luteous yellow. Pleuræ with long fine yellow hairs or pile. Abdomen yellowish red, shining; pollinose bands narrow, that on the second very

narrow; first segment, under the scutellum, the second with a median stripe, the third with a stripe more or less dilated behind, and the fourth chiefly, black. The anterior femora behind with long fine light yellow hair. Wings nearly hyaline, the costal cells scarcely infuscated.

Two specimens, Mt. Hood, Or. The moderately abundant, long, light yellow fine hair on face, pleuræ and four anterior femora is characteristic.

GONIA EXUL, n. sp.

♀. Length 12, 13 m. m. Front and face light yellow, with a semi-translucent appearance as though oiled; when seen obliquely, with a silvery sheen; sides of the face with numerous, short, black bristles, on the inner part, near the sides of the median depression, with three or four moderately stout bristles; median depression small and narrow, not as wide as the sides; cheeks without black bristles. Antennæ blackish brown, second joint and base of third yellow; second joint about one-third the length of the third; arista variable, third joint not twice the length of the second. Dorsum of thorax gray pollinose, when seen from behind leaving four moderately broad stripes, the margins more or less and the scutellum yellow. Abdomen yellowish red; first segment under the scutellum, the second with a broad median stripe, the third except the anterior angles, or, rather, with a large triangle reaching the whole width of the segment behind and touching in front more or less broadly, the dorsum of the fourth wholly black; pollen of the whole abdomen variable in different reflections, but most conspicuous on the base of the third and the whole of the fourth segments. Wings nearly hyaline, the veins yellowish, except posteriorly.

Ten specimens, Connecticut, Massachusetts, New York.

a. Males from California, that I cannot distinguish, have the antennæ wholly black, the third joint five or six times the length of the second, the face strongly silvery pollinose, and the claws and pulvilli very large, considerably longer than the terminal joint of the tarsi. In some, the black triangle on the third abdominal segment is much smaller. A female with them seems to agree in all respects with the Eastern specimens.

b. A female specimen from California, with the abdomen marked similarly, has the third joint of the antennæ shorter, not more than twice the length of the second, the second joint of the arista very short, and the bristles on the sides of the median depression not parallel with the edge, but divergent, whisker-like.

c. Two female specimens from Arizona differ distinctly in having a broader and more projecting face, smaller eyes, whiter and more dense pollen on face, thorax and abdomen. Another specimen with these two, however, though agreeing in the latter respects, has the face of the usual width.

d. A male specimen from North Park is of a distinct species, though closest allied to the present. The sides of the face are unusually narrow, the front short, convex and almost horizontal, the abdomen marked more like that of *G. senilis*, the size smaller (11 m.m.), the claws and pulvilli large.

GONIA SEQUAX, n. sp.

♂. Length 12–13 m.m. Like the males of *exul*, except that the abdomen is either wholly yellowish red, with a black spot under the scutellum, and a brownish hind margin to the third segment, or with a slender black stripe on the second, and a small triangle on the third and fourth segments. The claws and pulvilli are very much smaller, much shorter than the terminal joints of the tarsi.

Three specimens, California.

NOTES ON THE GENUS EXOPROSOPA.

BY D. W. COQUILLETT, LOS ANGELES, CAL.

In my paper on "The North American Genera of Anthracina," which appeared in the last volume of the CAN. ENTOMOLOGIST (pp. 157–159), I proposed the name *Velocia* for those species of *Exoprosopa* which have four submarginal cells in each wing. Through the kindness of Dr. Williston, I have been put in possession of a paper by Prof. Camillo Rondani, entitled "Dipterorum Species et Genera Aliqua Exotica," published in 1863 in the Archivio per la Zoologia, vol. iii., and on pages 56 and 57 of this paper Prof. Rondani proposes the name *Hyperalonia* for the above group; this name being the earlier, must supersede the one proposed by me.

In the same paper Prof. Rondani proposes the name *Argyrospila* for those species of *Exoprosopa* in which the third and fourth veins are joined together before the margin of the wing, instead of reaching the margin

separately; but I am firmly convinced that this character is too variable to be used for a generic separation. In a large series of *Exoprosopa doris* O. S. collected in Los Angeles County, Cal., every grade occurs, from the widely open first posterior cell to the contracted, closed in the immediate margin, or some distance before the margin of the wing. Those of the latter kind do not otherwise differ in any respect from the ones in which this cell is wide open, and as specimens of the latter kind were taken at the same time and place as the former, there seems to be no doubt of their specific identity.

I have discovered another form, closely related to *Exoprosopa*, but differing from it and from all other Anthracina known to me, in that the first posterior cell is divided by a cross-vein into two cells; following is a description of this new form:

Exoptata, n. gen.—Third antennal joint furnished with a distinct terminal style; second vein issues from the third opposite or nearly opposite the small cross-vein; anterior branch of the third vein connected by a cross-vein with the second, forming three submarginal cells; first posterior cell divided into two cells by a cross-vein placed some distance before tip of discal cell; anterior branch of third vein and veins 2, 3 and 4 terminate in margin of wing; no pulvilli.

Exoptata divisa, n. sp.—Front obscure chestnut-brown, pale yellowish tomentose and black pilose; face reddish-brown, pale yellowish tomentose; hyperstoma much produced; first two joints of antennæ reddish-black, black pilose, third joint black, elongate-conical at base; style about one-sixth as long as third antennal joint; proboscis projecting length of labella beyond the hyperstoma; occiput black, yellowish-white tomentose. Thorax black, yellowish tomentose, the sides and collar yellowish pilose; bristles above insertion of wings, black; pleura yellowish pilose. Scutellum reddish-brown, yellowish tomentose, the margin beset with black bristles. Abdomen obscure reddish-brown, irregularly spotted with black; first segment and base of the second pale yellow tomentose, apices of second and third segments black tomentose, base of the third white tomentose, fourth segment mixed black and yellow tomentose, fifth, sixth and seventh segments white and sparsely black tomentose; sides of first segment and base of second yellowish pilose, sides of rest of abdomen black pilose; venter obscure reddish-brown, third and fourth segments black tomentose except a white tomentose spot in centre of each; other segments white tomentose. Legs and tarsi wholly black, the tomentum,

pile and spines also black; front femora and tibiæ destitute of stout bristles, claws of front tarsi scarcely visible. Wings blackish brown, the following parts hyaline; apices of marginal and first submarginal cells; second and third submarginal cell wholly; apical half of outer first posterior cell; second, third and fourth posterior cells except spot in base of each, that in second posterior cell extending into the third; apices of third basal and axillary cells; and middle third and apex of discal cell. Veins at bases of first submarginal, inner and outer first posterior, and of the third and fourth posterior cells, bordered with sub-hyaline. Halteres brown, the knob yellowish. Length 12–15 m. m. Two specimens. Cal.; Ariz. (Williston).

ALETIA ARGILLACEA.

BY A. R. GROTE, BREMEN, GERMANY.

I have found in various collections in Europe, both public and private, specimens of the moth of our Cotton Worm determined after Hübner as above. From a note from Dr. Staudinger, I gather that in his collection the moth is so determined and as proposed by me. Were I now to propose to call this species by its synonym, *Noctua xylina* Say, I do not think any of the entomologists in Europe would agree thereto, or be governed by Dr. Hagen's reasons for the change. Say was no Lepidopterist, and his posthumous description of the moth is not recognizable, only that he tells us it is the moth so injurious to cotton. By this we translate his description. But Hübner's figure and text are quite sufficient to identify the species, and he gives us the proper classification of these moths. I myself have shown how *Aletia* and *Anomis* are to be separated. The latter, with its orange colored and angulated wings, is a sort of tropical *Xanthia*. The tropical genera of *Noctuidæ* are all less woolly than the temperate forms. In *Aletia*, the smooth, untufted body, the entire wings, the broad head, prepare us for the Catocaline moths, *Poaphila* and *Agnomonia*. It differs from *Anomis erosa* by the broader wings, with straight external margin, and, as I first pointed out to Prof. Riley, by the number of false feet in the larva. There is a second true species of *Aletia* in Texas, *hostia* of Harvey, but this second cotton-feeder is also Southern and may have been described from Mexico or Central America previously.

The generic group is tropical. *Aletia* extends into the temperate regions, attracted by its food plant and urged by an inner impulse to migrate northwardly during our summer, helped on its wanderings by the winds from the Gulf. But the winter overtakes and extirpates it over a wide territory, fortunately for the planter.

BOOK NOTICES.

THE BUTTERFLIES OF INDIA.

We believe we are doing the readers of the CANADIAN ENTOMOLOGIST a service in calling attention to a work on the Butterflies of India,* which has been in progress for five years, and of which two volumes are now finished. It was begun by Major Marshall and Mr. de Nicéville, of the Calcutta Museum, but at the conclusion of the first volume Major Marshall was obliged to withdraw from active participation in the work and leave its completion to his coadjutor, who has just given us the second volume.

The task will be appreciated when its extent is known. "India, the land of sunshine, is a land of Butterflies," says the opening passage of the preface, and yet the empire includes within its limits "every climate, from the eternal snows to the tropics." The number of known forms is vast. Following the order of Kirby's Catalogue, the work has reached the Lycænidæ, and scarcely half is done; yet in these two volumes over six hundred species are already described from a region less than half as large as that embraced in Edwards' Catalogue of our species. The generic and family descriptions are almost wholly copied from Doubleday and Westwood's "Genera," but the species are freshly described, and there are added keys to the genera of each family and to the species of every genus or minor group of species. Geographical distribution, habits and variation

* The Butterflies of India, Burmah and Ceylon. A descriptive handbook of all the known species of Rhopalocerous Lepidoptera inhabiting that region, with notices of allied species occurring in the neighboring countries along the border; with numerous illustrations. By Major G. F. L. Marshall and Lionel de Nicéville, Calcutta. Vol. 1; 8 + 327 p., 18 pl., 1882–84. Vol. 2; 8 + 332 p., 8 pl., 1886. 8°.

are the principal topics treated in the non-descriptive matter, and this is reasonably full for such a work, and adds very decidedly to our knowledge. Undoubtedly when the insects come to be reared, many of the nominal species will be found to belong together, for De Nicéville has already discovered the probable existence of seasonal dimorphism in the Bombay Butterflies, "there being in several species an ocellated form which occurs only in the rains, the cold and dry seasoned being non-ocellated."

We regret, however, to say that the work adds practically nothing to our knowledge of the earlier stages. This will surely follow the publication of this first and only handbook to the Butterflies of England's great eastern empire, for, as the authors point out, such a work as the present is a *sine quâ non* to an attempt at that co-operation through which alone any great advance can be made toward a general knowledge, either of the elements of the fauna or of the life-histories of its prevailing types. When we remember, however, that our knowledge of the transformations of eastern Butterflies has hardly advanced in fifty years as much as it advanced at a bound a half century ago by the labors of Horsfield alone, we are glad to be assured that when this present preliminary task is done, Mr. de Nicéville will direct his energies and the grand opportunities his position at the Indian Museum afford him to this more telling work. We wish him then all speed in the completion of the present task.

One word about the illustrations, which are wonderfully good. They are drawn by two native artists, Grish Chunder Chuckerbutty and Behari Lall Dass—they must be natives—and mostly reproduced by "autotype" in London; they are therefore monochromatic, but the results are far superior to anything we have seen in which photography has borne a part. The half tones are wonderfully caught, and their closest examination reveals the unusually skillful and delicate touch of the artist. There are twenty-six plates in the two volumes, including one good chromo-lithograph, a plate of structural details, and one of caterpillars and chrysalids, besides a dozen or more wood cuts in the text.

The book will be completed in four or five octavo volumes of fine type, and it is expected within three years. Each of the volumes completed costs 14 rupees (about 25 shillings), and it is hoped that 60 rupees will cover the entire cost. Subscriptions can be sent to B. Quaritch, 15 Picadilly, London, Eng.

S. H. Scudder.

CATALOGUE OF CANADIAN PLANTS. PART III: APETALÆ, by John Macoun, M. A., F. L. S., F. R. S. C., Montreal. 1886.

The last publication issued by the Geological and Natural History Survey forms the third part of Prof. Macoun's Catalogue of Canadian Plants. Part I., POLYPETALÆ, and Part II., GAMOPETALÆ, have already been noticed in these pages. Part III., APETALÆ, carries the work on to the end of the Exogens and completes Volume I.

The value of this important work, which is quite indispensable to every student of Canadian Botany, is much enhanced by the Addendum and comprehensive Index of the whole volume, contained in the present Part. In the former we find corrections and additions to the information recorded under each species in Parts I. and II., so as to bring our knowledge of the whole of the plants mentioned down to date, and in the latter not only are the orders, genera and species given, but every synonym also appears.

In the publication of this work Prof. Macoun confers a lasting benefit upon the scientific world. No living Botanist has the knowledge of Canadian plants which he has acquired. Possessed of a keen faculty of observation which almost amounts to an instinct, he has had the advantage of travelling extensively and of collecting and studying in their native habitats most of the plants which have been found growing spontaneously in Canada. Moreover, by generously assisting all who apply to him for information, he has secured the hearty co-operation in his work of all the active Botanists in Canada, so that the "Catalogue of Canadian Plants" is not only a record of his own vast experience, which extends over a period of more than 30 years of constant study, but also includes the work of all other collectors and Botanists who have investigated or written upon the Flora of the Dominion.

So closely are the studies of Botany and Entomology associated together that some knowledge of Botany is actually a necessity to the Entomologist; particularly is this the case in the interesting work of investigating the life-histories of insects. It frequently happens that a very slight knowledge of the affinities of a given plant may save from starvation valuable larvæ which have been transmitted to a distance from the place where their proper food-plant occurs. Most larvæ will subsist upon plants of the same genus or others closely allied to them.

A good instance of this is presented in the numerous *Coliades*, all of

which will flourish upon the Common White Clover *(Trifolium repens)*, although in a state of nature they may, according to the species, feed upon plants belonging to a dozen different genera, all of which, however, will be found to be of the same Natural Order as the clover *(Leguminosæ)*. The *Argynnides*, again, will all feed upon our common blue Violet *(V. cucullata)*, as will the *Pierides* upon common and easily procured cruciferous plants.

On the other hand, for a right understanding of the shapes and positions of flowers, and for a full appreciation of the beautiful methods by which fertilization of the ovules is secured, a knowledge of the structure and habits of insects is of inestimable value.

There is, too, an economic aspect of this case, for if insects will survive upon plants which are only and perhaps distantly allied to their natural food, it is obviously necessary that the cultivator should take this into consideration when engaged in the constant strife which he has to wage against injurious insects, and we even find that some species will actually flourish better upon such cultivated plants, when grown in large numbers; the Colorado Potato Beetle may be instanced in this connection, which thrives so luxuriantly upon the cultivated potato, but which, when confined to its natural food, the *Solanum rostratum*, eked out but a precarious existence. Otherwise it is useless to abstain from the cultivation of any crop which has been badly attacked, as a means of starving out its insect enemies, in a locality where there are numerous wild plants or weeds which are allied to the plant which it is desired to grow. This must be borne in mind with regard to the many pests affecting cereals which are able to find ample temporary lodgment in the various wild grasses.

J. FLETCHER.

NOTE.

LIVING PUPÆ.—The Rev. W. J Holland (5th Avenue, Oakland, Pittsburgh, Pa.) has a large number of living pupæ of *Telea Polyphemus*, *Actias Luna*, *C. Promethea* and *Angularis*, *E. Imperialis* and *C. Regalis*, reared in the South, which he desires to dispose of at reasonable rates. His object is to assist and encourage a poor lad whom he has interested in Entomology. Application should be made to him at once.

CORRESPONDENCE.

BRITISH COLUMBIAN HYMENOPTERA.

Dear Sir,—I wish to acknowledge through the pages of THE CANADIAN ENTOMOLOGIST the following type specimens of British Columbian Hymenoptera, which will form a valuable addition to the Society's collection, from the Rev. George W. Taylor, of Victoria, B. C.:

Ichneumon Vancouveriensis, Prov.,	CAN. ENT.,	xvii.,	p. 114.
Platysoma (nov. gen.) *tibialis*, Prov.,	"	"	115.
Limneria compacta, Prov.,	"	"	116.
Mesoleptus fasciatus, Prov.,	"	"	116.
Phylax pacificus, Prov.,	"	"	117.
Phylax niger, Prov.,	"	"	117.

The types of *Mesoleptus fasciatus* and *Phylax pacificus* were unluckily injured in transmission, but the others are in good order. This donation was announced at the last annual meeting, but was omitted from the report of the meeting published in THE CAN. ENTOMOLOGIST. I take this opportunity of drawing the attention of our members to the importance of following Mr. Taylor's example in presenting to the Society types of new species, or unique specimens, so that they may be placed in a position of safety, and at the same time may be accessible for examination by all. We have at present the finest collection of Canadian insects extant, and it is to the advantage of all of us to add to it and make it as perfect as possible. We have a commodious museum and good cabinets, so that all donations will be properly cared for and will be highly prized.

JAMES FLETCHER, President Ent. Soc. Ont.

NORTH AMERICAN BUTTERFLIES.

Dear Sir,—In Mr. W. H. Edwards' last catalogue of the Diurnal Lepidoptera of America north of Mexico, is given, on pages 80-81, a list of species formerly credited to the North American fauna, but which he

omits for want of authentication. Among the species so enumerated I find the following:

Callidryas cipris, Fab.
Gonepteryx mærula, Fab.
Terias elathea, Cram.
Megistanis acheronta, Fab.
Aganisthos orion, Fab.

Now I have specimens of all of these species which I purchased a few years ago from Mr. Herman Strecker, the locality in which they were taken being given by him as Texas. Now as it is of course inconceivable that an Entomologist of Mr. Strecker's standing would attach a false locality to a specimen in order to sell it, I trust that Mr. Edwards will include these species in his next catalogue.

H. H. LYMAN, Montreal.

LEPIDOPTEROUS LARVA.

Dear Sir,—In response to the very interesting communication on page 124 of volume xviii. of THE CANADIAN ENTOMOLOGIST, I would suggest to the two lady Entomologists that the larva is very probably that of the Birch Dagger *(Apatela vulpinam.)* It is certainly, I think, that of one of the Dagger Moths, and, if there is a variation in the color of the tufts from published descriptions by Mr. Thaxter, perhaps it is not enough to suspect a different species. I need not add that it gives me great pleasure to see the interest which our ladies take in the study of Entomology, nor how very much we owe to them already, as Mr. Edwards has recently shown in the story of the discovery of the Aphid-feeding larva of that interesting butterfly, *Feniseca Tarquinius*. In my earliest papers I referred to the important discoveries of women in a science which needs delicate powers of observation and handling. From Madam Merian to our own day, the list widens gloriously, and I often wish that the names and addresses of all the lady workers in America could be got together. When I come home again I mean to try and secure them for publication, and I hope (as every one must away from home) that the day will be soon.

A. R. GROTE, Bremen, Germany.

The Canadian Entomologist.

VOL. XIX. LONDON, FEBRUARY, 1887. No. 2

COLLECTING AT THE ELECTRIC LIGHT, 1886.

BY HENRY S. SAUNDERS, LONDON, ONT.

On the evening of Saturday, May 22nd, 1886, being the first warm evening after the electric light system was started in London, hundreds of "electric light bugs" *(Camptobrochis grandis)* and large green Calosomas *(Calosoma scrutator)* came into the city, and from that time on throughout the summer, and even as late as Nov. 2nd, the lights continued to attract hundreds of insects every warm evening.

There are some general points I should like to mention before giving the list in detail :—The lights around which all the collecting was done, were in store windows, or just outside of them, and these were in the centre of the city ; the insects were either on the glass, on the woodwork around it, or on the sidewalk. Moths were taken with a bottle as in sugaring ; beetles taken by hand and put into a separate bottle. Cyanide of potassium I found the best poison ; a few drops of chloroform on cotton would quiet them more quickly, but was more troublesome, the chloroform having to be frequently renewed, occasionally as often as four or five times during the same evening, and sometimes even then the moths would be found alive the next morning.

My collecting was all done between 10 and 12 p. m. No lights were lit on Sundays, and I was out of the city from July 24 to Aug. 9.

On very cold nights very few insects would come out ; on cool nights a few moths were always to be found, but seldom any beetles ; on warm nights both beetles and moths were plentiful. Beetles were *very* plentiful only on the warmest evenings.

Often on wet evenings the Sphingidæ would be plentiful when there was scarcely anything else out.

My record of dates is very incomplete, as I had no idea while collecting of publishing them in this way.

There are about 35 Lepidoptera and 5 Coleoptera that I have not suc-

ceeded in getting named; the Orthoptera, Hemiptera, etc., I scarcely collected at all; having but little time at my disposal, I thought it wiser to give attention mainly to those orders in which I was more particularly interested.

I take this opportunity of thanking Prof. C. H. Fernald, of Amherst, Mass., Mr. Jas. Fletcher, and Mr. W. H. Harrington, of Ottawa, for the kind assistance they have given me in naming specimens.

LEPIDOPTERA.

Nymphalidæ.

Vanessa antiopa, *Linn.*, June 21.*

Sphingidæ.

Deilephila chamænerii, *Harr.*, June 1–22.
" lineata, *Fabr.*, Sept. 4.
Everyx myron, *Cram.*, June 17 to July 15, constant. Very common.
Ampelophaga versicolor, *Harr.*, July 17.
Smerinthus geminatus, *Say*, June 15.
Paonias excaecatus, *A. & S.*, June 14, July 9. Common.
Calasymbolus myops, *A. & S.*, July.
Triptogon modesta, *Harr.*, June 29, July 12.
Cressonia juglandis, *A. & S.*, June 2–18.
Ceratomia amyntor, *Hubn.*
Daremma undulosa, *Walk.*, June 28, July 10. Common.
Sphinx drupiferarum, *Ab. & S.*, June 8 to 22. Common.
" kalmiae, *A. & S.*, June 8.
" eremitus, *Hubn.*, May 31.
Dilophonota ello, *Linn.*, Sept. 28–30.†

Ægeriadæ.

Trochilium——? May 28–29, June 14, July 1–16. Very common.
Eudryas unio, *Hubn.*, June 15–16, July 1, Aug. 9. Common.
" grata, *Fabr.*, June 25, July 1, 7, 19. Common.
Ctenucha virginica, *Charp.*, June 19.

Bombyces.

Nola ——? July 16.
Hypoprepia fucosa, *Hubn.*, July 20.
Euphanessa mendica, *Walk.*, June 21.
Crocota treatii, *Gr.*, July.
Arctia virgo, *Linn.*, *var.* parthenice, July 19.
" Saundersii, *Gr.*, August 24.
Pyrrharctia isabella, *Abb. & S.*, June 5 to July 20, very common.
Phragmatobia rubricosa, *Harr.*, July 15.
Leucarctia acraea, *Drury*, June 23, August 19.
Spilosoma virginica, *Fabr.* Very common from May 26th to Aug. 20; one taken Oct. 20.
Hyphantria cunea, *Drury*, June 19, July 20.
Euchaetes egle, *Drury*, June 28.
Halisidota caryae, *Harris.* Very common from May 27 to June 25.
" maculata, *Harris*, June 7–25. Common.

* This butterfly I did not see in motion; it was in rather a sleepy condition, and may possibly have flown there during daylight.

† Eight specimens of this moth were taken in London about this time.

Orgyia leucostigma, *A. & S.*, July 14–20, Sept. 24, Oct. 22.*
Euclea querceti, *H. S.*, June 16, July 1.
Ichthyura inclusa, *Hubn.*, Aug. 11.
" albosigma *Fitch*, May 27, June 15.
Datana ministra, *Drury*, June 14, 16, 23, July 9.
" integerrima, *G. & R.*, June 23, July 9.†
Nadata gibbosa, *A. & S.*, July 3.
Gluphisia trilineata, *Pack.*
Seirodonta bilineata, *Pack.*
Notodonta stragula, *Gr.*
Cœlodasys unicornis, *A. & S.*
Heterocampa marthesia, *Cram.*
" astarte, *Doubl.*
" cinerea, *Pack.*
Cerura borealis, *Boisd.*, June 5–16.
" cinerea, *Walk.*, May 28, June 15.
Actias luna, *Linn.*, June 7.
Telea polyphemus, *Cram.*, June 2, 28, 30, July 2. Common.
Platysamia cecropia, *Linn.*
Dryocampa rubicunda, *Fabr.*, May 26 to July 1. Very common.
Clisiocampa americana, *Harris*, July 1, 5.
Gastropacha americana, *Harris*, June 16, July 22.
Tolype laricis, *Fitch*, Aug. 13, 24.
Prionoxystus robiniæ, *Peck.*

Noctuæ.

Raphia abrupta, *Gr.*, (?) June 15.
Habrosyne scripta, *Gosse*, July 23.
Apatela occidentalis, *G. & R.*, May 29, June 11. Common.
" vinnula, *Gr.*
Apatela lepusculina, *Guen.*
" morula, *G. & R.*, June 24.
" innotata, *Guen.*
" rubicoma, *Guen.*.
" americana, *Harr.*, June 9, 18, July 1. Very common.
" hæsitata, *Gr.*
" brumosa, *Guen.*, June 1.
" dissecta, *G. & R.*, July 6.
" oblinita, *A. & S.*, June 8, 15. Very common.
Arsilonche albovenosa, *G.*, May 27, June 9.
Harrisimemna trisignata, *Walk.*, July.
Micrococlia diphteroides, *Guen.*, June 14, 16.
Agrotis C nigrum, *Linn.*, June 19, 21, 23, Aug. 21, 24, 26, 30. Very common.
" haruspica, *Gr.*, July 7.
" fennica, *Tausch.*, Aug. 10.
" subgothica, *Haw.*, August 24, 30.‡
" tricosa, *Lintn.*, Aug. 12, 13.
" plecta, *Linn.*, May 29, June 1, 19, 21, 23, 25, Aug. 11, 12, 18, 20, 24, 26. Common.
" clandestina, *Harris*, June 28, 29.
" scandens, *Riley*, June 15, 19. Common.
" murænula, *G. & R.*
" tessellata, *Harris*, June 26, 29. Common.
" campestris *var.* decolor, *Morr.*, July 2, 6.
" collaris, *G. & R.*
" annexa, *Tr.* (?).

* None seen between July and September; those taken in the fall were larger and darker than in the summer.

† At the time of collecting I did not know the difference between these two species of Datana; judging from the specimens taken they were probably both quite common.

‡ August 24 was the first time I took this moth, and on that evening it was very common.

Agrotis volubilis, *Harv.*, June 14.
" ypsilon *Rott.*, June 17, Sept. 25, Oct. 22, Nov. 2. Common.
" pressa *Gr.*
Mamestra adjuncta, *Boisd.*, June 4, Aug. 13.
" lubens, *Gr.*
" legitima, *Gr.*, July 5, 19.
" subjuncta, *G. & R.* (?)
" trifolii, *Rott.*, May 29, June 15, Aug. 20. Very common.
" renigera, *Steph.*, Aug. 24, 30, Sept. 25. Common.
" lorea, *Guen.*, June 18, 21.
Luceria passer, *Guen.*, June 23, July 3.
Hadena devastatrix, *Brace.*
" arctica, *Boisd.*, June 17, July 21. Common.
" sputatrix, *Gr.*, Aug. 18.
" suffusca, *Morr.*
" mactata, *Guen.*, July 9, 16.
Perigea xanthioides, *Guen.*
Dipterygia scabriuscula, *Linn.*, June 7.
Hyppa xylinoides, *Guen.*, Aug. 24.
Valeria Grotei, *Morr.*, May 29.
Homohadena badistriga, *Gr.*, July 10.
Brotolomia iris, *Guen.*
Euplexia lucipara, *Linn.*
Helotropha reniformis *var.* atra, *Gr.*, July 3.
Apamea sera, *G. & R.*, July 18.
" nictitans, *Wlk.*
Gortyna cataphracta, *Gr.*, Sept. 24.
Achatodes zeae, *Harris.*
Sphida obliquata, *G. & R.*
Heliophila pallens, *Linn.*, Aug. 21, 22. Not seen at any other time.
" albilinea, *Hubn.*, Aug. 10.
" phragmitidicola, *Guen.*, Aug. 10, 12, 19.
Pyrophila tragopogonis, *Linn.*, July 12. Common.
" pyramidoides, *Guen.*, Aug. 10.
Orthodes infirma, *Guen.*
Orthosia ferrugineoides, *Guen.*
" euroa, *G. & R.*, July 16.
Scoliopteryx libatrix, *Linn.*, June 29, July 7.
Cucullia asteroides, *Guen.*, Aug. 24.
" intermedia, *Spey.*, May 28.
Adipsophanes miscellus, *Gr.*, July 9.
Crambodes talidiformis, *Guen.*, May 29, July 3.
Nolaphana malana, *Fitch.*, July 19.
Marasmalus histrio, *Gr.*, July 16.
Abrostola urentis, *Guen.*, July.
Plusia aerea, *Hubn.*
" aereoides, *Gr.*
" balluca, *Gey.*, July 9.
" contexta, *Gr.* (?) Aug. 19.
" Putnami, *Gr.* (?) June 16.
" mappa, *G. & R.*, July 19.
" precationis *Guen.*, May 22, 28, 29, July 15, 21, Aug. 12, 26, Oct. 22. Very common.
" simplex, *Guen.*, May 29, June 21, 25, July 10, 12. Common.
Chloridea rhexiae, *Ab. & S.*, Oct. 20.
Rhodophora florida, *Guen.*, July 8.
Heliothis armiger, *Hubn.*, sept. 24, Oct. 20.
Pyrrhia (angulata, *Gr.* or experimens, *Walk.* ?), June 1, July 1.
Tarache erastrioides, *Guen.*, June 15, Aug. 11.
" candefacta, *Hubn.*, May 30.
Chamyris cerintha, *Guen.*, June 19, 21.
Eustrotia albidula, *Guen.*, June 14, 26.
" muscosula, *Guen.*, June 26, July 21.

Eustrotia carneola, *Guen.*, May 29, 30, June 1, 19, 25, 28, 30, July 1. Very common.
" apicosa, *Haw.*, June 15.
Placodes cinereola, *Guen.*, June 9, 16.
Drasteria erechtea, *Cram.*, July 15, 19, 20, 21, Aug. 10, 11, 18, 20. Very common.
Catocala concumbens, *Walk.*, Aug. 24.
" briseis, *Edw.*, (?) Aug. 26.
" parta, *Guen.*, Aug. 20.
Parthenos nubilis, *Hubn.*, July 9.
Panopoda rufimargo, *Hubn.*
Ypsia undularis, *Drury*, May 23, 29, June 4, 23.
Homopyralis tactus, *Gr.*, June 15.
Pseudaglossa lubricalis, *Gey.*, July 9.
Rivula propinqualis, *Guen.*, June 9, 14, 15.
Phalenophana rurigena, *Gr.*, June 29.
Capis curvata, *Gr.*, July 5.
Hypena baltimoralis, *Guen.*, June 5, 11.
" evanidalis, *Rob.*, July 9, 14.
" scabra, *Fabr.*, Aug. 18.

Geometridæ.

Choerodes transversata, *Drury*, Aug. 12.
Tetracis crocallata, *Guen.*, May 29, June 11.
" lorata, *Gr.*, June 1, 5, 7.
Matanema quercivoraria, *Guen.*, July 9.
" carnaria, *Pack.*, May 29, June 12.
Ennomos alniaria, *Linn.*, Aug. 24. Very common.
Eudalimia subsignaria, *Hubn.*, July 5, 12, 20.
Endropia obtusaria, *Hubn.*, June 24, July 3.
" bilinearia, *Pack.*, July 19.
Endropia armataria, *H. S.*, June 14. Very common.
" hypochraria, *H. S.*, June 8, 14.
Sieya macularia, *Harris*, July 3.
Angerona crocataria, *Fab.*, June 21, 23, 26, 29. Very common.
Nematocampa filamentaria, *Guen.*, May 29.
Plagodis phlogosaria, *Guen.*, July 15.
Hyperitis amicaria, *H. S.*, June 8.
Aplodes Packardaria, *Gr.*, May 23.
Ephyra pendulinaria, *Guen.*, Aug. 22.
Acidalia inductata, *Guen.*, Aug. 11.
" quadrilineata, *Pack.*, June 16, 17.
" enucleata, *Guen.*, July 8, 15.
Stegania pustularia, *Guen.*, July 5.
Deilinia variolaria, *Guen.*, July 9.
Semiothisa ocellinata, *Guen.*, Aug. 11.
Phasiane trifasciata, *Pack.*, Aug. 9.
Lozogramma defluata, *Walk.*, June 17.
Eufitchia ribearia, *Fitch.*, July 3, 8.
Haematopis grataria, *Fabr.*, Aug. 13.
Hemerophila unitaria, *H.S.*, May 29.
Cymatophora pampinaria, *Guen.*, July 21.
Tephrosia anticaria, *Walk.*, July 7.
Eubyja cognataria, *Guen.*, June 11, July 9.
" quernaria, *A. & S.*, May 29.
Hybernia tiliaria, *Harris*, Oct. 22.
Heterophleps harveiata, *Pack.*, (?) June 11.
" triguttata, *H. S.*, June 16, 28, July 16.
Lobophora montanata, *Pack.*, June 4.
Triphosa indubitata, *Gr.*, Oct. 22.
Phibalapteryx latirupta, *Walk.*, (?) July 8.
" intestinata, *Guen.*, May 23.
Rheumaptera ruficillata, *Guen.*
" lacustrata, *Guen.*, May 23, 29.

Ochyria ferrugaria, *Linn.*, Aug. 13.
" designata, *Hubn.*, May 29.
Petrophora diversilineata, *Hubn.*, July 8.
Hydriomena trifasciata, *Borkh.*, July 3, 5.
Epirrita perlineata, *Pack.*, July.
Plemyria fluviata, *Hubn.*, July 12.
" multiferata, *Walk.*, June 15.
Glaucopteryx cumatilis, *G. & R.* June 15.
Eupethecia miserulata, *Grote*, May 28, June 17, 19, 25, July 9. Common.

Pyralidæ.

Asopia farinalis, *Linn.*, June 16, 29, July 1, 21. Very common.
" costalis, *Fabr.*, June 28, 29, 30, July 12, 15, 21, 23, Aug. 9, 12, 24, 26. Very common.
" olinalis, *Guen.*, July 8, 9.
Cordylopeza nigrinodis, *Zell.*, July.
Dicymolomia decora, *Zell.*, June 21, July 5.
Scoparia centuriella, *S. V.**
" libella, *Gr.*, June 28, July 3, 15, 16.
Botys badipennis, *Gr.*, Aug. 11.
" marculenta, *G. R.*
" gentilis, *Gr.*, Aug. 13.
" venalis, *Gr.*, July 5.
" illibalis, *Hubn.*, June 15, July 7.
" plectilis, *G. R.*, June 21.
Nomophila noctuella, *S. V.*, July 6, 9, 15. Common.
Diathransta octomaculalis, *Fern.*, MSS., July 3, June 15.
Desmia maculalis, *Westw.*, June 24, July 16.
Hydrocampa genuinalis, *Led.*, June 12, 15, 16, 18.
" ekthlipsis, *Gr.*, June 15.
Cataclysta fulicalis, *Clem.*, June 14, 15, 21.
" angulatalis, *Led.*, May 29, Aug 11. Common.
Homophysa (—— ?) July 15.
Nephopteryx basilaris, *Zell.*, July.
Salebria fusca, *Haw.*, June 28, July 3.
Anerastia haematica, *Zell.*, June 14, 15, 16.
Euphestia ochrifrontella, *Zell.*, July.
Argyria nivalis, *Drury*, July 15.
Crambus leachellus, *Zinck.*, June 21, July 1, 3.
" agitatellus, *Clem.*, June 21.
" agitatellus *var.* alboclavellus, *Schl.*, July.
" albellus, *Clem.*, June 28, July 3, 21.
" bipunctellus, *Zell.*, July 16.
" topiarius, *Zell.*, July 3, June 14, 23.
" exsiccatus, *Zell.*, May 29; this specimen much darker than the others. June 15, 19, July 3, 20. Very common.
" luteolellus, *Clem.*, July 5.
" ruricollelus, *Zell.*, Aug. 11.
Schoenobius longirostrellus, *Clem.*, July 8.
" clemensellus, *Rob.*, June 15, July 3. Common.

Tortricidæ.

Cacœcia rosaceana, *Harris*, June 19, 20, Aug. 11.
" argyrospila, *Walk.*, July 7.
Loxotaenia clemensiana, *Fern.*, June 14, 23.
Ptycholoma melaleucana, *Walk.*, June 14, 28.
Lophoderus quadrifasciana, *Fern.*, June 28, July 1, 3.

* Very common on June 28, when I saw it for the first time this season; afterwards a few only were seen for a week or two, after which I did not see it again.

Tortrix albicomana, *Clem.*, July 1.
" peritana, *Clem.*, July 8, 9.
" fumiferana, *Clem.*, June 16.
" conflictana, *Walk.**
Cenopis pettitana, *Robs.*, June.
Dichelia sulfureana, *Clem.*, June.
Conchylis angulifasciana, *Zell.*, June 7.
Eccopsis exoleta, *Zell.*, June 23.
Penthina frigidana, *Pack.*, July 15.
" nimbatana, *Clem.*, July 3.
Sericoris constellatana, *Zell.*, June 14.
Steganoptycha pinicolana, *Zell.*, July 19.
Carpocapsa pomonella, *Linn.*, Aug. 12.

Tineadæ.

Hyponomenta multipunctella, *Clem.* July 3, 21.
Coleophora corruscipennella, *Clem.*, June 29, July 22.

Pterophoridæ.

Oxyptilus periscelidactylus, *Fitch.*, July 1, 3, 5.
Pterophorus marginidactylus, *Fitch.*, June 24, 28, July 1. Common.

COLEOPTERA.

Carabidæ.

Calosoma scrutator, *Fab.*, May 22–29, June 29.
" Wilcoxi, *Lec.*, June 1.
Nebria ——— ? June 14, 15.
Clivina americana, *Dej.*
Nomius pygmæus, *Dej.* July 8, June 14. Very common.
Bembidium planum, *Hald.* July 7.
" patruele, *Dej.*, July 16.
Amara avida, *Say*, July 2, 10, 19.
" obesa, *Say*, July 2, 10.
Diplochila major, *Lec.*, June 14, 16.
Badister pulchellus, *Lec.*, Aug. 21.
Platynus metallescens, *Lec.*, June 15.
" placidus, *Say*, July 16, June 15, Aug. 10.
" obsoletus, *Say*, June 27, July 2.
Lebia grandis, *Hentz.*, Sept. 24.
Brachynus cordicollis, *Dej.*, June 15.
Chlaenius sericeus, *Forst.*, June 14, 15. Common.
" tricolor, *Dej.*, May 29, June 14, July 5.
Agonodorus lineola, *Fab.*, June 14. Very common.
" pallipes, *Fab.*, May 22, June 14, July 5, 7, 10. Very common.
Harpalus viridiæneus, *Beauv.*, June 14.
" caliginosus, *Fab.*, July 16, 25, Aug. 9.
" pennsylvanicus, *DeG.*, July 5, June 14, 15. Aug. 9, 10 11, 12, 20, 24.
Anisodactylus discoideus, *Dej.*, June 1, 14.

Dytiscidæ.

Hydroporus signatus, *Mann.*
Colymbetes sculptilis, *Harr.*, June 14, 11, 24. Very common.
" —— ? July.
" biguttulus, *Lec.*, June 15, (v. c.) 16, July 2, 3, 5. Very common.
" —— ? May 22, July 2, 3.

* Saw for the first time on June 28, when it was very common; a few only were to be seen the next three or four evenings, after which I did not see it again.

Dytiscus fasciventris, *Say*, May 22, June 16, July 3, 5, 12, 16, 10, Oct. 22. Very common.
" cordieri, *Aubé.*, July 1, 3, 5, 21. Common.
" Harrisii, *Kirby*, July 5, 19, 21. Common.

Gyrinidæ.

Gyrinus ventralis, *Kirby*, July 3, 5
Dineutes assimilis, *Aubé*, May 29, Sept 23.

Hydrophilidæ.

Hydrophilus glaber, *Hbst.*
Hydrocharis obtusatus, *Say*, July 3, 5, 10. Very common.
Philhydrus diffusus, *Lec.*, July 5.
Hydrocombus lacustris, *Lec.*, July 16.
Hydrobius fucipes, *Linn.*, June 14, 15, 24, July 3, 10.
Cercyon unipunctatum, *Linn.*, Aug. 9.

Silphidæ.

Necrophorus americanus, *Oliv.*, May 29, June 16, 24, July 10, 19. Very common.
" orbicollis, *Say*, June 25, July 19.
Silpha surinamensis, *Fab.*, May 22, June 1, 2, 8, 25, July 1, 19, 20, Aug. 23. Very common.

Staphylinidæ.

Bledius semiferrugineus, *Lec.*, June 14, July 8, Aug. 9. Common.

Coccinellidæ.

Adalia bipunctata, *Linn.*, July 19.

Mycetophagidæ.

Typhœa fumata, *Linn.*, Aug. 9.

Dermestidæ.

Dermestes lardarius, *Linn.*, Oct. 22.
Attagenus megatoma, *Fab.*, July 6.

Lathridiidæ.

Corticaria pumila, *Lec.*, (?) July 16 to Aug. 20. Very common.

Elateridæ.

Alaus myops, *Fab.*, June 14.
Melanotus communis, *Gyll.*, June 9, 26, July 1, 2, 10, 15, 21. Very common.
Athous cucullatus, *Say.*
Asaphes memnonius, *Hbst.*, July 1, 3, 10. Very common.

Lampyridæ.

Pyropyga nigricans, *Say*, July 9.
Photuris pennsylvanica, *De G.*, June 23, July 2.
Podabrus basilaris, *Say.*
" modestus, *Say*, June 29.

Ptinidæ.

Trypopitys serviceus, *Say*, July 15.
Bostrychus bicornis, *Web.*

Cupesidæ.

Cupes capitata, *Fab.*, Sept. 24.

Lucanidæ.

Lucanus dama, *Thunb.*, July 10.
" placidus, *Say.*
Passalus cornutus, *Fab.*

Scarabæidæ.

Copris anaglypticus, *Say*, June 14, 15. Common.
Aphodius granarius, *Linn.*, June 14, May 29.
Odontaeus cornigerus, *Melsh.*
Trox porcatus, *Say*, June 14.
" aequalis, *Say*, June 14 (v. c.)
" striatus, *Melsh.*
Dichelonycha linearis, *Schon.*, May 29.
Lachnosterna fusca, *Froh.*, May 29, 22, 31. Very common.

Lachnosterna cognita, *Burm.*
Pelidnota punctata, *Linn.*, July 3.
Cotalpa lanigera, *Linn.*, May 22, 29, 31, June 1. Common.
Ligyrus relictus, *Say*, Aug. 9.
Xyloryctes satyrus, *Fab.*

Cerambycidæ.

Criocephalus agrestis, *Kirby*, June 28, 27, July 10. Very common.
Chion garganicus, *Fab.*, June 14.
Xylotrechus colonus, *Fab.*, July 5.
Centrodera decolorata, *Harr.*, June 14.
Monohammus confusor, *Kirby.*
Urographis fasciatus, *De G.*, June 14.
Eupogonius vestitus, *Say*, July 16.
Saperda calcarata, *Say*, July 3.
" vestita, *Say*, June 14.
" tridentata, *Oliv.*, June 14, 15, 16. Common.

Chrysomelidæ.

Diabrotica vittata, *Fab.*, Sept. 24.

Tenebrionidæ.

Tenebrio molitor, *Linn.*, June 14, July 2, 5. Very common.
Hoplocephala bicornis, *Oliv.*, June 14.

Cistelidæ.

Allecula nigrans, *Melsh.*

Pythidæ.

Salpingus virescens, *Lec.*, July 5.

Anthicidæ.

Notoxus anchora, *Hentz.*

Curculionidæ.

Listronotus caudatus, *Say*, June 14.
" appendiculatus, *Boh.*, June 14.
Pachylobius picivorus, *Germ.*, June 14.
Hylobius pales, *Host.*, June 15.

Anthribidæ.

Cratoparis lunatus, *Fab.*, June 16.

ORTHOPTERA.

Platyphyllum concavum, July 16.

HYMENOPTERA.

Ophion bilineatus (?) May 29. Common.

DIPTERA.

Stomoxys calcitrans.
Chrysops striatus (?)

NEUROPTERA.

Corydalis cornuta, June 26, 30, July 5.
Chauliodes pectinicornis, May 29, June 1, 16, 25, July 21, Aug. 11, 19, 20, 24.
Neuronia postica (?) May 29, June 14, July 1, 9.

HEMIPTERA.

Camptobrochis grandis, May 22, 31, June 1, 9. Very common; afterwards a few seen occasionally through June, July and August.

NOTE ON HEMARIS UNIFORMIS AND ARCTIA SAUNDERSII.

BY A. R. GROTE, BREMEN, GERMANY.

I have sufficiently shown in various places (and the enquiring student may consult the originals) that Kirby's description of *Ruficaudis* contradicts that of *Uniformis*, in what we must regard as essential particulars in this genus. We have not here to do with a species; but, according to Mr. Hulst's statements, with a dimorphic form of *Thysbe*, in which the inner margin of the terminal band of primaries is *even*, not *dentate*, on the interspaces. Now this character is not at all alluded to by Kirby. He describes a *Sesia* allied to the European, and he says and knows nothing about *Thysbe* or *Pelasgus* or *Cimbiciformis*. Kirby should not have described *Uniformis* without comparing it with its ally—its other well known form. Notwithstanding the probabilities of the case or the possibilities, it never can be proved from the books that Kirby did describe *Uniformis* as *Ruficaudis*. This is a matter of scientific importance, because we are the first to point out that two distinct "forms" if not "species" were passing as *Thysbe*, the differences which constantly divide them being first pointed out by us, first used as the basis by which they can be correctly separated and named in collections. It is therefore no matter of simply restoring an older name. It is an attempt at construing an older name and one which does not really apply. The attempt is therefore to be deprecated as unscientific. The whole point lies in the separation of the forms passing current as "*Thysbe*." In this lay the scientific value of the writings of Mr. Robinson and myself. This discovery, important or not important (real it certainly is), was made by us and is covered by the designation we apply to the plain form, and, according to all sense and the principles of scientific nomenclature, this name should henceforward apply. Clemens does not recognize *Ruficaudis;* Fernald mentions our insect as "*Uniformis;*" I take it for granted that these or similar considerations have influenced his course. It is years and years ago since I studied Kirby in the original, at least fifteen years before Mr. Hulst's time. It needed not that this industrious, but in his earlier studies somewhat inconsiderate writer, should tell *me* of the probabilities of what Kirby's might be. At the best they are probabilities. I take it, that to be correct, scientifically correct, the form of *Thysbe* with *even* edge to the external band of primaries and of the same or similar size with the type,

should be called *Uniformis* G. & R., without any reasonable doubt. I will not enter here into the question of the even banded forms, *Buffaloensis* and *Floridensis*. The larva of the former is described by Professor Lintner. The latter has not been examined in sufficient quantity. I think now that both these forms are distinct, certainly sufficiently so as to merit a distinct title, if not of specific value. *Fuscicaudis*, Boisd., is, from the markings of the abdomen, certainly a distinct species. After myself examining specimens I can come to no other conclusion.

Quite similar arguments show that we are justified in calling the smaller of the two forms of *Arctia*, which have buff striped, black fore wings, and red, spotted secondaries, by the name *Saundersii*. I carefully considered Kirby's description of *Parthenice* after my discovery that two species were passing as *Arctia virgo* in collections. The character which separates the two is the narrower ochre veining of *Saundersii*. Again as with the *Hemaris*, Kirby fails to compare his species with *Virgo* Linn., which it was his business to know had he intended to describe as closely allied a species as *Saundersii* is. I pass by the probably correct surmise of Mr. Hy. Edwards that Kirby describes an unimportant variety of *Virgo*, assuming this author to be correct. But be this as it may, I am the first to scientifically separate the forms, to carefully describe them, to figure them side by side (at my own expense, which was a good deal in those days), to give the essential characters by which they may be known and named henceforth. This being so, it is inconsiderate, and, scientifically speaking, an erroneous view which would overturn this real work and restore a name which can never be proved to be correctly applied. Always there must be a doubt hanging over the name *Parthenice*, from Kirby's own fault in ignoring *Virgo*. But there is no doubt about *Virgo* or *Saundersii*. I cleared those doubts up years ago, and Mr. Hulst should have profited by my work rather than attempt to re-introduce the uncertainty which I had, I think properly, dissipated.

ELAPHIDION VILLOSUM, Fabr.

BY FREDERICK CLARKSON, NEW YORK.

In support of the record relating to the periods of transformation of this beetle, and the probable cause of their pruning the branches of the Oak, which I had the pleasure to contribute to the XVII Vol. of this

journal, I now add some further facts, resulting from a recent visit to Clermont, N. Y.

On the 29th of October I gathered from under a group of *Quercus tinctoria*, seven branches that had been pruned by this longicorn. The tunnels were from ten to fifteen inches long, in branches from one-half to three-quarters of an inch in thickness. The branches I carefully divided lengthwise, so that the parts could be replaced in position. Six of them contained the pupa, one the larva, which pupated November 4th. One of the pupæ I preserved as a specimen. The imagines appeared on the following days: Nov. 14th, 22nd, 26th, 29th, Dec. 9th and 25th, all females.

These transformations were rather hindered than advantaged by meteorological conditions, for they occurred in a room having a northern exposure, in which, during the period of the transformations, the thermometrical record differed but little from that in the shade without. Had the branches remained upon the ground, the included insect would have received all the benefits resulting from the direct rays of our Indian Summer's sun, as well as the moisture from the ground; influences that ordinarily assist development. As the imagines appeared they were examined and replaced in their tunnels, where they now remain in a passive state, and not likely, I think, to exhibit their natural activity until next May or June.

The object of the paper referred to, as well as this article, is to present facts that seemingly disprove certain theories relating to the habits and metamorphoses of this beetle, which have been formulated by distinguished sires and accepted by their credulous sons. What Drs. Peck, Fitch and Harris have written upon this subject has been substantially repeated by almost every entomologist who has undertaken a history of this beetle. We are very apt to fall into line when we have an abiding confidence in a leader. While I am unwilling to deny the conclusions of these naturalists, I yet think that the facts related go to show that the insect matures at a period earlier than that named by them, and that the benefits supposed to result from the dismemberment of the branch, in so far as the changed environment is concerned, are wholly unnecessary to the development of the included insect, and that there is a plausibility in the inference, if not a certainty as to fact, that the object of pruning the branch is to prevent the flow of sap. If the habits of this beetle as given by these doctors are to be regarded as *ipso facto*, then we must admit the

possession of a faculty in these lower organisms that towers above instinct and presents the feature of intelligent reason. This is a subject that cannot very well be discussed in these pages, yet it may not be out of place to say that able writers on the question very generally admit that the habits of insects follow a prescribed law, by some regarded, in a materialistic sense, as mechanical; and by others, spiritually considered, as in furtherance of a divine edict. This latter view is very cleverly presented by St. George Mivart, in Organic Nature's Riddle: "Our experience," he writes, "is in favor of the existence of an intelligence which can implant in and elicit from unconscious bodies activities that are intelligent in appearance and result . . . . . 'Unconsciously intelligent action,' improperly called 'intelligent,' is that which is called intelligent only as to its results and not in the innermost principle of the creatures which perform such actions." "Instinct," Todd says in his Cyclopædia of Anatomy and Physiology, "is a special internal impulse urging animals to the performance of certain actions which are useful to them or to their kind, but the uses of which they do not themselves perceive, and their performance of which is a necessary consequence of their being placed in certain circumstances."

If such definitions are accepted, how are they to be reconciled with the marvellous statement as given by Dr. Fitch? That the larva should prune the branch to prevent the flow of sap would be a necessary consequence of its being placed in certain circumstances, but to do so that the branch may fall to the ground presents a course of reasoning that relates to a condition foreign to the then existing environment. The habits of this beetle from the period of egg-hatching, as given by Dr. Fitch, displaying as it did to him extraordinary intelligence, impress me as presenting the most natural instinctive qualities. The ova, he says, is deposited on a small green twig, the soft pulpy tissues of which nourish the infant larva, which when increased in size and strength, attacks the hard wood of the branch, transversely, in a circular direction, consuming it all, leaving the branch supported only by the bark. From these premises, without pursuing the subject further, it is evident that the infant larva requires sap-wood for its sustenance, which it derives from the twig, but so soon as its strength permits, it seeks for dead-wood by attacking the branch, which is found more and more free from sap as the work of severance progresses. The aim therefore from the start is to obtain the dead-wood,

and when the branch is eaten through the larva continues its feeding in forming a tunnel through that portion of the branch which is cut off from the supply of sap.

The instinct of insects is wonderful enough, and more accurate perhaps than a mental process, but while we justly ascribe to them all the attributes pertaining to their natural gift, we are not warranted in imputing to them an intelligence only to be arrived at through a course of reason.

BOOK NOTICE.

THE BUTTERFLIES OF NEW ENGLAND, with original Descriptions, accompanied by eight lithographic Plates, in which are given at least two hand-colored Figures of each Species. By C. J. Maynard. Boston, Bradlee Whidden, 1886.

The author of this work is a well-known taxidermist and ornithologist, who here endeavors "to present recognisable figures and intelligible descriptions of the Butterflies," etc. The drawings and descriptions, he says, are original, but he has been obliged to compile descriptions of the larva and pupa from works of various authors, and is indebted to such works for many notes upon habits, distribution, etc.

He has coined a new set of names for the veins of the wings, and likewise a set of English names for the several species. No authority follows the specific names in the text, but those "who are curious to learn who first described any given species, can ascertain by referring to an Index," etc. He sees no reason why polymorphic forms, which he calls "phases of coloration," should receive names, and in this connection thinks that entomologists have overlooked the results of an important law, that of reversion. The classification adopted is that used in the arrangement of the collection of the Boston Soc. N. Hist., "merely because of its simplicity," and hence the series begins with the Satyridæ, and Papilio stands next the Hesperidæ. By all which it will be seen that the author has ideas of his own, but is not very well read in the recent literature of lepidopterology.

The plates are described as hand-colored, and it seems to be implied that the coloring therefore is something superior. Whereas it is very bad indeed—could not well be worse. This is conspicuously so in Limenitis,

Vanessa, Grapta, Argynnis, and Euptoieta. Papilio *Troilus*, plate 7, is simply atrocious. I doubt very much if any one not familiar with the butterflies could identify several of the species of Thecla from the figures, and I am sure they could not identify many of the Hesperians. And the drawing is of the roughest.

In giving a title, the author should have respected the claim of Mr. Scudder, who, as all the world knows, has been engaged for years on "The Butterflies of N. E.," and is about publishing the same.

Whenever in this book larvæ or habits are treated of, there are pretty sure to be errors, both of commission and omission, and this is inexcusable, as in nearly or quite every instance, careful descriptions of the preparatory stages and habits were or could have been before the compiler. The result is such as to destroy largely any value the text might have. Thus:

Under *N. Canthus*, we are told that the larvæ are green. Now there are green larvæ, but so far as has been observed, the larger number are buff. See CAN. ENT., xv., 64. Also it is said of this species that the larva moults three times in fall, then hibernates, and moults three times in spring. No butterfly larva moults six times, and those treated of vary in habit. Some moult twice and hibernate, then three times in spring, while other larvæ go to pupa in one season with but four moults.

Of *N. Eurytris*, we read: "Larva not dissimilar to that of *Alope*, but smaller." There is no near resemblance whatever between the larvæ of these two species in any stage, but a great and generic difference.

Of *D. Archippus*, we read that the larvæ moult three times, whereas they moult four. See Psyche, ii., 53.

Of *Arg. Cybele:* "The earlier stages of this species are not very well known. The larvæ have been kept in confinement by Mr. Edwards, and moulted five times, and during the winter went into the chrysalis state." I gave full account of all stages of the larva, CAN. ENT., xii., 141, and therefore the early stages are very well known, and a life history, vol. vi., p. 121; and the pupation took place, not in winter, but in May.

L. Disippus: Larva described as having a horn on second ring, and on third, fifth, etc., a spiny process each, the eleventh with two short spines. Now every ring mentioned here has a pair of processes instead of a single one. In the account of the habits of this species, not a word is said of the case made by the larva for hibernating. On the contrary, we have the incorrect statement that the larvæ remain in pupa all winter.

The most remarkable thing in the history of North Am. butterfly larvæ is the making these cases by all the species of Limenitis, and it would seem incredible that the merest collector should not have known that. How comes it then that no mention of such a habit should be found in a work professing to have been written for instruction of beginners? Nothing is said under *Ursula* of such cases, but under *Arthemis* we are told that the larvæ "construct a case of leaves," instead of a case from a single leaf. Moreover the larvæ of these three species of Limenitis are described as regards the processes on them as if they were radically different from each other, whereas they are all built on the same pattern, and where one has a process all have a similar one.

Of Argynnis *Myrina*, we read that the larvæ moult three times. Now the larvæ of the early brood moult four times, and of the late brood, five. C. Ent., vii., 189.

Under Mel. *Phaeton*, we read that these butterflies have restricted areas, living in peaty meadows, and that the larvæ make a web, but no mention is made of the food-plant, Chelone glabra, which grows in such meadows or in swamps, and is the reason for the presence of the butterflies there.

Under Thecla *Irus*, we read that Mr. Edwards says the eggs are laid on wild plum, etc., "very interesting," etc. I said nothing of the kind. My account was of *T. Henrici*, and I expressly said that I could not get *Irus* to lay on plum.

Under Lyc. *Pseudargiolus*, Mr. Edwards is quoted as saying that hibernating larvæ produce typical *Pseudargiolus* in spring. On the contrary, the larvæ in no case hibernate, but the pupæ do, some to produce *Violacea*, some *Pseudargiolus*.

Of Fenesica *Tarquinius*, we read that the larvæ feed on wild currant, whereas they feed on aphides only.

Of Anthocharis *Genutia*: "There are two broods in the season, the first of which appears in July." There is but one brood in the year, and the chrysalis hibernates. The early butterflies, from these chrysalids, appear at Newburgh, N. Y., early in May. Doubtless just as early in Conn., which is given as their N. England habitat.

Of Papilio *Troilus*: "The larvæ spin a little roof over the leaf, drawing the edges together." That might do for Pyrameis *Atalanta*, but not for *Troilus*. The larva, as soon as out of egg, cuts into the border of the leaf about one tenth inch and draws the part over, holding it down by a

few threads. The nearly mature larva turns over the side of the leaf, and loosely stitches down the edge, but there is at no time a roof spun, nor is there any roof except what the turned leaf makes.

Such a list of blunders shows heedless and ignorant compiling. Another class shows want of knowledge of the butterflies. Thus, *D. Portlandia* is compared with *N. Canthus*, "which it resembles quite closely." It has but a very distant resemblance to *Canthus*, differing in size, shape and markings. So *Portlandia* is compared with *N. Eurytris*, just as erroneously as in the other case.

As to polymorphism, the phenomena are ignored everywhere, and the names of the forms often, as per Preface, but sometimes the names are given.

It certainly is proper that such a remarkable peculiarity in the life history of a species should be recognised, and the different forms indicated by name. Indeed they are by lepidopterists. Often they are more distinct from each other than are many allied species. "Mr. Sprague informs me that the first brood of *G. Comma* is dark in color, while the next is lighter." What Mr. Sprague means is this, that the brood proceeding from eggs of the hibernating butterflies (form *Harrisii)*, is the dark or summer form *(Dryas)*, and the late brood, from eggs of *Dryas*, is *Harrisii*.' "I think however that specimens having the peculiar rusty under surface to the wings are confined to particular localities, hence, judge that perhaps different food plants produce varying color." Now these rusty examples are the females of the form *Dryas*, this species being in the summer form sexually dimorphic, as well as seasonally. I have repeatedly showed the distinction between the two principal forms of *Comma*, CAN. ENT., vi., 157; x., 69; xiv., 189. Also in But. N. A., vol. 1, a plate is devoted to each form, and each sex is figured on both surfaces. The dimorphism of both sorts is universal wherever *Comma* is found, and food has nothing to do with it, more than has locality.

Under the head of *G. Interrogationis*, we are told that there are two broods, in June and September, and that "Mr. Edwards states that he has raised both forms *Fabricii* and *Umbrosa* from one brood of larvæ, but that Mr. Sprague, who has had a wide experience with our native species, informs me that he has invariably found the dark form is the early or summer form, and the lighter the later. Consequently very early in the spring he has caught *Fabricii*, this being the autumnal form which hibernates." The dark form is *Umbrosa*, the name indicating the color, and is the pro-

duct in New England as elsewhere of the form *Fabricii*. Our author proceeds: "The reason for this variation" (that is, between the dimorphic forms) "is difficult to explain, as neither food nor atmospheric change appear to have anything to do with it, for we find that Mr. Edwards has produced both forms where the larvæ were found under precisely the same circumstances." Both the forms spoken of are figured in But. N. A., vol. 1, and the life history at Coalburgh is given at length. Also in C. E., x., 73, and xiv., 201. I gave the result of many years observations at Coalburgh on this species, stating that all the hibernating butterflies had been *Fabricii*, except in a single instance; that the eggs laid by females of this early *Fabricii* produced a mixed brood, the large majority of individuals being *Umbrosa*. And eggs of *Umbrosa*, of this mixed brood, again produced a mixed brood, the large majority still being *Umbrosa*. But that eggs of these last *Umbrosa* had produced *Fabricii* only, late in the year, and these were hibernators. At the north, where there are two broods only, the dimorphism is complete, and this is the case with all seasonally-dimorphic species of butterflies, which are also only two-brooded. But at the south, or where the length of the warm season permits one or more additional broods to mature—and these seem to be inserted between the two original ones—the result in such additional broods is a mixture of the two forms. But in the case of *Interrogationis*, there is a preponderating tendency towards the summer form, *Umbrosa*, imperfectly counteracting the inherited tendency of the species to produce the winter form *Fabricii*, as it would in New England.

These results are not only interesting but biologically very important, and the forms are not to be regarded as simple variations. Food has nothing to do with dimorphism, nor has atmospheric change, but climate has. Vide Weismann, vol. 1. In my paper referred to, CAN. ENT., x., p. 73, I offered a conjecture that at the north, *Fabricii* would be found to be the winter form and *Umbrosa* the summer, and expressed a hope that some lepidopterist would examine into the matter and report. If Mr. Sprague has made the necessary observations, I hope he will publish them.

Under Melitaea (Phyciodes) *Tharos*, we are told that the larvæ of first brood give the "butterflies known as *Morpheus*," while the larvæ of the second hibernate, to produce "the butterfly known as *Myrina*," in June. That is a mistake for *Marcia*. But here again the names of the forms had to be used to make the story intelligible.

Satyrus *Alope* is given as one species, *S. Nephele* as another, though

both are but dimorphic forms of the same species, as I have set forth in C. E., xii., 21. In B. N. A., vol. 2, two plates are devoted to these forms and varieties, and the whole history is given. It is a very curious history too, and one not to be neglected in a work meant for instruction.

A particularly objectionable feature of the work in hand is the manufacture of English names for the species, one and all. The custom of applying such names will never become general in this country, and fortunately. In Europe, before the binomial nomenclature was invented, it was natural that there should be local names for such striking objects as butterflies. A few, some half dozen, European species have become domesticated on this continent, and I have noticed that Americanized English collectors are fond of recalling the vernacular names they knew at home. But even these names have nowhere come to be used commonly here. Some of our authors, however, have exerted themselves to fix such names on all the American butterflies, and the result is fantastic. The greatest sinner in this respect, I regret to have to say, is Mr. Scudder, but as he has lately announced, Science, No. 194, that he regards all names as necessary evils, it would seem to follow that a superfluity of names is an unnecessary evil; therefore I hope to see these appendages dropped in his forthcoming work. No one but the contrivers use them; they do not stick to the insect. No better illustration of this could be offered than in Mr. Maynard's book. What Mr. Scudder calls Blue-eyed Grayling, the other calls the Yellow-spotted Wood; what one calls Eyed Brown, the other Ten-spotted Quaker! what one calls The Viceroy, the other the Banded Red; what one calls the Great Spangled Fritillary, the other the Yellow-banded Silver Wing. Now the butterfly last spoken of is known as Argynnis *Cybele*, the name a beautiful one, by the side of which the appellations above given are as tawdry as they are long-winded. So all through. It is best in Entomology, as in every other kind of learning, that beginners begin right, and as every species has its proper specific name, by which it is universally known, and of which it can never be divested, no elementary work has a right to teach otherwise.

The descriptions of the insects are well enough, except as to the nerves of the wings. These organs have ages ago received names which have been accepted, and there is no reason whatever for changing them, especially in a work of the character of this one. "Middle" is no more simple than "median," and means the same thing; "upper vein" instead

of "sub-costal" is misleading, in fact wrong, because the uppermost vein is the costal.

And the arrangement of families was adopted "merely because of its simplicity," but wherein that consists it would be hard to discover. It is not a natural arrangement; if it was, the Satyridæ would next precede the Hesperidæ. However there has been a fashion these last years for artificial grouping of the butterflies, and our author is not without reputable company in his choice.

In conclusion, the illustrations in this work, poor as they are, will answer some purpose; the text, so far as it is incorrect, is worse than nothing. The field is still open for a well-illustrated book on the same butterflies, written by one who is acquainted with his subject.

W. H. EDWARDS.

CORRESPONDENCE.

ON THE GENUS QUADRINA.

Dear Sir,—I notice the remarks of Mr. Smith, in "Entomologica Americana" (vol. ii., 1886, page 124), merely to state that in my original description I comment upon this singular genus and say that "it may be catalogued next to *Gloveria*." I further regard its affinities to the *Ceratocampidæ*, and I intended to place it with this group in my catalogue. By a mistake of the printer it was thrown into the preceding group. It is clear that I regarded the insect as allied to *Citheronia*, and Mr. Smith's remarks as to *Hemileuca* are uncalled for. I say distinctly, "altogether it is removed from *Coloradia*" (Papilio, I., 175). In fact, I regard *Quadrina* as the remains of an old type, synthetic, in that it embraces characters of existing sub-families of the *Bombycidæ*. It is an example of what I have called attention to, viz., the existence in America of older types than elsewhere, such as the *Paleohesperidæ* of my classification. I am decidedly opposed to the idea that *Quadrina* is a Cossid. I regard it as a type between *Gloveria* and *Citheronia*. I classed it with the Ceratocampians. We know neither the male nor the larva. It is premature to be exact as to its location. It may well afford a new sub-family type. I feel confident that the larva will be an external not an internal feeder. It may point to the way in which the Ceratocampians and the internal feeders with similar habitus are phyllogenetically related.

A. R. GROTE, Bremen, Germany.

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DESCRIPTION OF THE PREPARATORY STAGES OF COENONYMPHA AMPELOS, Edw.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Egg.—Conical, truncated, the top nearly flat, slightly depressed, covered with a fine network of irregular six-sided meshes; these form four rings about the central rosette, in middle of which is the micropyle; the lower part and base rounded and thickly covered with shallow indentations; the sides ribbed, the number of ribs about 34, vertical, slightly sinuous, more so at lower end, narrow, with rounded spaces between, which are crossed by many fine lines; color yellow-green. Duration of this stage about 12 days. The egg is like that of *Galactinus*, but has fewer ribs.

Young Larva.—Length, at 24 hours from egg, .11 inch; cylindrical; thickest at 2 to 4, tapering on dorsum and sides to 13, ending in two short, conical tails, which meet at base; color pale yellow-green; a mid-dorsal reddish line, and three similar lines on the side, the upper one sub-dorsal, the lowest running with the spiracles, and the middle one nearer the lowest; surface covered with fine white tubercles, which give appressed downy hairs; among these are white clubbed processes, all bent back, except those on 2; these form three rows on each side, one sub-dorsal, a mid-lateral, with a demi-row on 2 to 4 between the long rows; in all these one process to the segment; the third row is at base, over feet and legs, two processes on each, from 5 to 11; one each on 3 and 4; on 2, 12, 13 two hairs to each, in place of processes; these lower processes are smaller, and turned down; head one half broader than 2, rounded, narrowing toward top, a little depressed, granulated; over the face a few white tubercles with processes as on body, bent down; color pink-brown. Duration of this stage about six days.

The young larva is in all respects like *Galactinus*, except slight differences in coloration.

After First Moult.—Length, at 18 hours from moult, .2 inch; nearly same shape; color yellow-green; surface thickly beset with white tubercles, and downy; a mid-dorsal green line, three similar ones on side, the two lower nearest together, the lowest being next over the basal ridge,

which is light yellow ; ends of tails pink ; under side, feet and legs green ; head sub-globose, depressed at top, the surface much covered with white tubercles and hairs ; color green. Duration of this stage about 11 days.

After Second Moult.—Length, at 24 hours, .3 inch ; shape as before ; color more green than yellow ; dotted as before with white tubercles ; tails rough with tuberculations, reddish ; stripes as at last previous stage, the two lateral less distinct ; the basal ridge yellow ; head emerald, tubercles as before. To next moult 6 days.

After Third Moult.—Length at 24 hours, .42 inch ; in six days, one larva of the brood was full grown.

Mature Larva.—Length .7 inch ; cylindrical, a little thickest anteriorly, dorsum and sides sloping very gradually, the former to 10 and then rounding to 13, ending in two conical, short, stout tails, which meet at base, and are rough with tuberculations ; whole surface covered thickly with fine rounded white tubercles, each of which gives out a fine short hair, making a downy coating ; these hairs are clubbed, or tapering, or cylindrical ; color dark green, the sides yellow-green ; the tails reddish ; a mid-dorsal darker green stripe ; on the sides traces of two stripes (the sub-dorsal having disappeared) ; the basal ridge light yellow ; under side, feet and legs green ; head broader than 2, sub-globose, a little depressed, beset with white tubercles and hairs, the surface finely granulated ; color yellow-green, the principal ocellus emerald in brown ring. From third moult to pupation 10 days.

After Fourth Moult, after hibernation.—Length .49 inch ; not differing in color or markings from third summer moult.

Chrysalis.—Length .4 inch ; greatest breadth, at mesonotum, .12, at abdomen, .14 inch ; shape of *Galactinus ;* cylindrical, stout, the upper end truncated, the abdomen swollen, conical at extremity ; head case narrow, ending in a sharp cross ridge which is a little arched, the sides excavated roundly ; mesonotum prominent, arched, the carina rounded transversely, the sides slightly convex, followed by a shallow depression ; color delicate green ; marked by nine black stripes placed as in *Galactinus ;* of these, one on dorsal edge of each wing case from base to inner angle of wing ; a curved stripe on middle of each wing reaching the hind margin ; a short stripe on same margin on ventral side of the curved one ; two short stripes on the antennae cases ; besides these, there is a black mark on either side of 13 ; top of head case whitish. Duration of this stage

10 days. Whole period from laying of egg to imago, in summer, 49 days, of which the egg was 12 to 13, larva 25 to 26, chrysalis 10.

After the second and third moult, which took place last of June and early in July, all the larvae but the one which went to pupation 30th June, became lethargic, and evidently would hibernate. I put four of these on ice, 26th July, and nine others, 4th August, to see if some weeks of that treatment would not serve for their resting period as well as the entire winter, with ordinary exposure. On 23rd August, I brought in one of the first lot, on ice four weeks. This had passed three moults. On 24th, it began to eat; on 26th, was .48 inch long; grew slowly and eat at long intervals. By 20th Nov., was .56 inch; and passed the fourth moult 2nd December. On 30th Dec., pupated. The pupa I put in alcohol. Another larva passed 4th moult, 6th January. Another same, 17th February. This last pupated 23rd May, and gave imago 3rd June. So that the exposure on ice, though it more or less fully aroused the larvæ, does not seem to have shortened the hibernating period, except in case of the single one which pupated 30th December.

The eggs of *Ampelos* were sent me by Mr. James Fletcher, then at Victoria, V. I., and were laid 22nd May, mailed 23rd, and reached me 3rd June. The first larva hatched 4th June.

On 21st June, I received a second lot, or rather, young larvae just hatched, and two eggs. These were laid on 9th and 10th June, and were mailed 11th. In both cases the females which laid the eggs were sent.

There seems to be no dimorphism in this species. The butterflies which came from chrysalis with me did not differ from the parents, and examples sent, taken in May and in August, were of the one type. Mr. Fletcher informs me that this was his experience. This species is of the size of *C. Ochracea* (smaller than *Galactinus)*, of a paler color; the under side of hind wings gray brown, sometimes paler beyond disk, sometimes of one shade from base to margin; with an interrupted, irregularly crenated band across disk; with no other mark, no spot towards base, no ocelli or spots along hind margin (all these spots are characteristic of *C. Ochracea)*. Mr. Fletcher writes: "I have never succeeded in finding an ocellus, and I am sure I have examined hundreds of examples." He also adds that the species is extremely abundant at Victoria.

Ampelos was described by me, 1871, in Tr. Am. Ent. Soc., from a pair received from Oregon. So that it probably is found at least from Oregon

to Victoria, and also probably west of the Cascade Mountains. I have not seen it from California, or other region.

The larvæ of this genus are exceedingly sluggish, in confinement resting on the grass stems or leaves, and scarcely moving except when the supply of food fails. They are easily bred. I am now feeding larvæ of *C. Ochracea*, and will in due time give report of it. I wish some one in the North-west, interested in these things, would send me eggs of *C. Inornata*, a dark brown, or brown-ochre species, with black-brown under side, found along the northern boundary of the U. S. in Dacotah, and in Brit. Am., on the prairies. Eggs can readily be had by confining females over grass in box or fruit can.

NOTE.—In my paper on the stages of *C. Galactinus*, vol. xviii., p. 201, the measurement of the mature larva should read .84 inch (not 1.06 inch).

ON THE GENUS RICHIA.

BY A. R. GROTE, BREMEN, GERMANY.

After examining the European *Ammoconia caecimacula* (in which the ♂ antennæ are dentate and furnished with pencilled setae or hair; the form stout; the tibiae, of the middle and hind legs only, spinose; the thorax and abdomen with slight dorsal tuftings), I find that my species are not congeneric, and I accordingly refer them to this genus named in memory of a Brooklyn Entomologist, Harvey J. Rich, who died while yet young, and whom I knew "before the war." The type of *Richia* is *Chortalis*, and its probable dimorphic form *Aratrix*, though we do not know quite surely whether the two are so related or not; they occur over the West and Southwest, to Texas. A second species is the Texan *R. sculptilis* of Harvey, a fine Noctuid. A third is my *Decipiens*, with its red form *Parentalis*, figured in my Essay. These differ by the untufted abdomen, spinose fore tibiae, the thorax having a *ridge* of hair (well shown in my figure, Plate 1, 13), as also by less robust form, agreeing with *Agrotis*. The genus, in fact, is not a Hadenoid form, and I refer to my paper on *Agrotis*, CAN. ENTOM., xv., 54, for my views as to its position.

I remember determining a fourth species from the West, and others doubtless will be found. At present I would thus arrange them:

Genus *Richia* Grote.

Chortalis *Harvey*.
dim. var. aratrix *Harv.*

sculptilis *Harvey*.
decipiens *Grote*.
var. parentalis *Grote*.

LIMOCHORES PONTIAC AND ATRYTONE KUMSKAKA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

In 1863, Mr. W. H. Edwards described a male Hesperian from Michigan under the name of *Hesperia Pontiac*, closely resembling the species figured by Boisduval and LeConte, under the name of *Arpa*, as well as the larger Florida species Edwards subsequently described under the name of *Pilatka*. In the same paper in which *Pontiac* was described and immediately preceding it, he described, also from Michigan, a female under the name of *Hesperia conspicua*. These two forms were subsequently figured in the same volume (II.) of Proceedings of the Entomological Society of Philadelphia, and were recognized as the male and female of the same species, after Prof. H. W. Parker had re-described the male (Can. Ent., III., 51), referring it to *H. conspicua*. In his since published lists, Mr. Edwards has classed them as one species under the preferred name of *Pontiac*.

In connection herewith I have made two mistakes: First, in identifying in 1868 an Iowa species as *conspicua* and describing the proper male of the same as the then supposed unknown male of *conspicua* (Trans. Chicago Acad., I., 336); and second, the re-description, very briefly, of *Pontiac* under the name of *Hedone Orono* (Syst. Rev. Am. Butt., 58), being led astray by my supposition with regard to the Iowa butterfly. I have since given the Iowa butterfly, which belongs to *Atrytone*, the name *Kumskaka*, in naming it for others; but as this name has not been published, nor the species fully described, I append herewith a full description of the same.

The two butterflies concerned belong to two different genera, one of which (*Limochores*, to which, and not to *Hedone*, *Pontiac* belongs,) has a sexual, velvety dash or stigma on the front wings of the male, wholly wanting in *Atrytone*, and they can thus be readily distinguished.

ATRYTONE KUMSKAKA.

Hesperia conspicua, Scudd. nec. Edw.

Head covered above with mingled greenish-yellow and blackish hairs, the former in excess; on the inner and outer side of the bases of the antennæ a tuft of black hairs; encircling the hinder part of the eye a series of pale yellow scales; palpi pale yellow, with a very slight greenish tint, shading into pale orange toward the tip and there interspersed with a

few black scales, which on the upper surface supersede the others; last joint black; antennæ black, annulated broadly below, narrowly above, at the base of each joint with glossy, pale lemon-yellow scales, which on the base of the stem are merged into a common bright patch; club, excepting as just stated, black; the crook dull castaneous to the very tip.

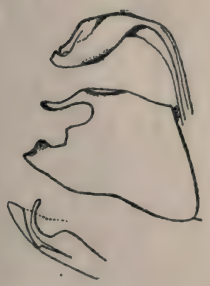
Thorax covered above with mingled greenish-yellow and brownish hairs, the brighter ones more conspicuous on the prothorax and patagia than elsewhere; beneath covered with pale yellowish hairs, mingled with dusky ones. Femora pale yellow, whitish above, the inside of the middle and hind pair dusky; tibiæ and tarsi dull orange, becoming dusky above, especially at the tips of the tarsal joints and increasingly so toward the tips of the legs; spurs pale orange, tipped minutely with testaceous; spines testaceous; spurs reddish; pad dusky.

Wings above tawny, exceedingly broadly bordered with dark brown, particularly in the female, where the tawny is reduced to a comparatively narrow interrupted band. Fore wings with the outer margin broadly bordered with dark brown, the interior margin of the border passing from the tip of the costal nervure on the costal margin in a bent, slightly curved, pretty regular line to the middle of the outer two-thirds of the submedian nervure, and passing midway between the apex of the cell and the outer margin of the wing; the inner margin is similarly bordered with dark brown as far as the submedian nervure; the costal edge is blackish, and within these encompassing borders the veins are distinctly marked with dark brown; besides which the outer limit of the cell and the outer half or two-thirds of the upper limit are rather broadly bordered externally with blackish, which often reaches to the costal border; besides, the basal third of the wing, and especially the part lying below the middle of the cell, is heavily begrimed with brownish scales, most conspicuously next the nervures; and all these latter markings are so blended in the female that no tawny color whatever is left but a small quadrate spot (often obsolete) at the tip of the cell, and a transverse, nearly equal, strongly curving or bent band next the outer bordering, about as broad as the width of the cell; this is indeed most frequently reduced to a series of 7 or 8 unequal longitudinal spots, forming a bent series lying farther removed from the outer margin, the upper portion starting from the middle of the outer half of the costal margin and directed toward a

point scarcely below the middle of the outer margin ; the other part of it is directed at right angles to the upper portion. Fringe dull brown, sometimes tinged with tawny, paling externally.

Hind wings so broadly bordered as best to be described as dark brown, with the central parts tawny; in the male consisting of a roundish patch cut by the nervures delicately traced in brown, extending nearest to the outer border (a little more than an interspace distance from it) on the lower subcostal nervure, and occupying the space between this and the tip of the cell, and reaching from the lowest median nervure to the middle of the subcostal interspace ; within the cell is an obscure tawny patch, and the medio-submedian interspace is obscured by some tawny hairs. In the female the fulvous colors are reduced to a series of longitudinal streaks, separated by broadly marked nervures, occupying the same place as the large patch of the male, but reduced in breadth. Fringe pale dull fulvous, the basal half brownish.

Beneath the markings are much the same, though scarcely so intense as above, and on the hind wings of the male very much obscured ; the tawny on both wings has become a dull lemon yellow, sometimes in the female rather pale, and the brown, excepting in the lower half of the fore wings, where it has turned to blackish fuliginous, has become obscure tawny brown, in the female tinged with fuliginous ; in the brighter portions the nervures are rather narrowly marked with tawny or brownish tawny, in the darker parts very faintly with yellowish or brownish yellow ; the tip of the cell in the fore wings of the male, and sometimes in those of the female, is marked with an oblique blackish streak, and at the tip of the cell of the hind wings of the male is a small obscure blackish spot next the nervure at either side. Fringe dusky, tipped with pale, more broadly below than above.



Abdominal appendages of *Atrytone Kumskaka*, male, viewed laterally; the lower partial figure shows the clasp as seen from beneath.

Abdomen black, the sides, especially on apical half, largely tinged with fulvous ; beneath pale yellowish, becoming tinged slightly with greenish toward the tip. The appendages of the male are shown on a side view in the accompanying sketch. The upper organ is very strongly arched,

almost bent in the middle, beyond which the heaviest part is found; this is not large but gibbous, transversely convex, and directed downward, the hooks straight, with a scarcely perceptible separation, together continuing the taper of the centrum, stout and very blunt and heavy at tip, where it is scarcely arched; lateral arms stout, curving upward and inward at tip, meeting just beyond the tip of the hooks. Clasps about half as long again as broad; the upper process broad and short, squarely docked, scarcely turned upward, but directed backward, a little incurved, the lower angle sharp, but the upper rounded; above this the posterior margin of the clasp retreats a little, and bears in the middle a broad and short truncate tooth, overhung by the upper process, the base of which is curved over so as to be horizontal, is similar to the lower process, but bears at its lower extremity a long, equal, slightly depressed, incurving finger, nearly half as long as the breadth of the clasp, its bluntly pointed tip touching the extremity of the upper organ.

Length of fore-wing, male 15.75–16.25 m.m., female 17.–17.5 m.m.; of antennæ, male 7.75–8.4 m.m., female 7.8–8.1 m.m.; of hind tibiæ and tarsi, male and female 7.75–8 m.m.; of fore tibiæ and tarsi, male 4.9–5.15 m.m., female 5.25–5.3 m.m.

Described from two males and three females from the Western States.

PREPARATORY STAGES OF APATELA FELINA, Grote.

BY G. H. FRENCH, CARBONDALE, ILL.

Young Larva.—Length .10 inch; body cylindrical; head broader than the body, oblique. Color of the upper part and sides of joints 2, 4, 5, 7, 8, 9, 12 and 13, reddish purple; the rest of the upper part and sides and the venter dull whitish; six rows of tubercles from which proceed small clusters of brown hairs, the four rows of dorsal clusters longer than the body; head black; feet purplish. Duration of this period, 4 days.

After First Moult:—Length .22 inch; shape about as before. The joints that were reddish purple during first stage are now black, the others white, the tubercles small, black; head black; hairs from the dorsal tubercles dark gray, the others white. Duration of this period, 3 days.

After Second Moult:—Length .35 inch. Color of the upper part

black and creamy white ; under part grayish brown, with two pretty well defined streaks of this color on the white part of the sides. The colors above are as follows : Joints 2 to 5 black, 6 white, 7 to 10 black, 11 white, 12 black, and the terminus of 13 black ; a fine dorsal line of clear white ; the tubercles the same as before, each bearing a cluster of hairs of various lengths, the longest nearly as long as the body ; the two dorsal tufts on joints 5, 7 and 12 with small pencils of short black hairs ; a few black hairs from the tubercles on the other black joints ; the hairs from the tubercles of the white joints clear white, with a few brown hairs intermingled in the dorsal pencils ; head and feet black. Duration of this period, 4 days.

After Third Moult :—Length .60 inch. On the dorsum are three stripes, a broad gray one in the middle, in the centre of which is a fine white line, and each side of this stripe a whitish stripe ; below this most of the side is pale yellow ; the whole strongly tinged with green. The tubercles bear thick clusters of short spreading hairs ; the dorsals on joints 5, 7, 8 and 12 black, with a few black ones in some of the others, but most of the rest of dorsal hairs white ; those from the white stripe, white ; those from the yellow stripe, yellow and mostly longer than the others ; a long fringe each side of the body, extending round the posterior extremity. Head and thoracic feet black. Duration of this period, 6 days.

After Fourth Moult :—Length 1 inch when at rest. Color of body yellowish green, with a gray dorsal stripe ; under parts grayish brown ; the whole body covered with fine yellow hairs that spring from the general surface as well as from the tubercles ; the tubercles or piliferous spots scarcely distinguishable from the general surface save that from these the hairs are more in clusters ; a few black hairs in place of the former black pencils. Head black, the front with the usual pale inverted Y ; the sides mottled with black and pale brown. Duration of this period from 4 to 5 days.

Mature Larva :—Length when crawling 1.60 inches ; when at rest 1.40 inches. Characters the same as at the beginning of the period.

Chrysalis :—Length .80 inch ; to end of wing cases .40, these extending almost to the posterior part of joint 5 ; depth from .21 to .22 inch ; cylindrical, tapering gradually from joint 5 back, the tongue case extending only to the anterior part of joint 5 ; the anterior part of abdominal

joints finely punctured; head rounded; wing cases slightly wrinkled. Color, mahogany brown, the wing cases and other anterior parts darker. Cremaster a series of short hooks extending out laterally, fastened into the lining of the thin cocoon. Duration of this period from 269 to 275 days.

The eggs from which the larvae upon which the above observations were made were received from Mr. C. F. McGlashan, of Truckee, California. They were deposited July 6th, 1885, reaching me the 12th, just as the young larvae emerged from them. This gives the egg period 6 days. This would give us a total from the egg to the moth of 296 days. This would give ample time for a second brood, as from the egg to pupation only consumed 27 days of the 296, and add to that 14 days, the usual pupal period of a great many of our moths. But it is quite probable that in its home in the Sierras these periods would be considerably lengthened out, so that the moth would not emerge from the chrysalids till some time in June, instead of from the 2nd to the 6th of May, as these did, as it is generally known that heat accelerates the growth of insects, and that cold retards the same. In the case of *Leptarctia Lena*, I find an exception to this general law, however.

The food plant of this insect is willow. In pupating, the larva fastened its cocoon closely against the side of the box (made of soft pine), some of the fibre of the unplaned board being woven into the outer part of the cocoon. The cocoon was thin, firm and tough.

NOTES ON SPECIES OF LEPIDOPTERA.

BY AUG. R. GROTE, A. M., BREMEN, GERMANY.

A. Observations on the Larvæ of certain Bombyces.

1. *Dryopteris rosea* Walk.

The full grown larvæ, in the beginning of July, feeding on *Viburnum acerifolium*, the "Maple-leafed Arrow-wood," * are, in their last stage, olivaceous brown, pale dorsally; dorsal line single, dark; a triangular

* The plant was determined for me by Mr. A. Pettingill, to whom I am indebted for more specimens.

dark patch on each side of the body commencing on segment 4 (I do not count the head) and bordered above the abdominal feet with pinkish; anal segment prolonged. Similar anal prolongations occur in the larvæ of other genera of this sub-family, and a resemblance to *Cerura*, where it is furcate, throws light on the relationship of these moths. In resting, the terminal segment is slightly elevated. A fleshy protuberance on the dorsal line on third segment. Pupation in a light, close web of pale brown silk, between the leaves (July 6–8). Coloration protectional, concealing the larva as it rests on the stem of the leaf. The spotting of the "tail" with pale is part of the protective coloration. After three weeks in the pupa the moth appears. Now that the whole history of *Dryopteris* is known, it is seen that in the structure of the larva and its habit it closely agrees with the other genera of the sub-family. It is probably double-brooded, the pupae of the second brood hibernating. An ally of this genus is described by Walker from Japan; whether the genera are distinct I cannot say. Walker does not even compare them, calling our moth a *Drepana*, while Herrich-Schaeffer calls it a *Cilix*. We have two species of *Dryopteris;* the larva of the second, *irrorata* Pack., is unknown to me.

In the few descriptions of larvae which I have drawn up, I commence the numerical series with the first prothoracic segment; it seems to me quite wrong to commence with the head, which must be described separately. Thorax 1–3; abdomen 4–12.

2. *Anisota stigma* Fab.

The larvæ on oak in July are in their last stage, light leather brown, a sub-dorsal row of stout black spinules, an infra-stigmal series all commencing on segment 2, which is provided with a pair of long black spines curved backwards; the skin is dotted over with white, especially on the segments anteriorly and beneath; a dorsal series of spinules, of which the one on 12 is stoutest; two on anal segment. There is a fore and aft symmetry in the disposition of these spinules, which must be looked upon as defensive in their nature. This caterpillar differs generically from that of *Sphingicampa bicolor* and *S. bisecta*. There is no doubt that we have two genera, but whether this last genus should not be called *Adelocephala* of Boisd., I cannot decide without South American types to compare. Enters the ground to pupate; a resemblance can be shown between all these larvæ, *Citheronia*, *Eacles*, *Anisota*, a progressive development of the

spinules into fleshy horns; by the development of the twelfth segment and its spine, an approach to the *Sphingidæ* is signalized, which the form of the moth somewhat confirms no less than the mode of pupation. I do not regard the *Sphingidæ* as related either to *Cossus* or *Hepialus*, but to the Ceratocampians (*Saturniadæ* in part) and *Notodontinæ*. As we shall see further on, there is a succession of development of the spines from *Dryocampa*, where they are merely present anteriorly and posteriorily and the body is naked, to *Citheronia*, where they are fleshy, long, exaggerated and complicated. I have not at this writing all the necessary material before me, but I have been interested in describing and figuring the simplest forms in this group of larvæ, and in showing that there is so great a difference and development of larval armature within this one group that we may use it as a guide in arranging the genera, of which *Eacles* would seem to be the highest in the series.

3. *Anisota virginiensis* Drury.

Already, as in the moth, the larva shows an approach to *Dryocampa* by the lessening of the armature. Taken on oak at the same time, this larva has the infra-stigmatal line of spinules weaker, as also the sub-dorsal series which rest on the reddish sub-dorsal stripe. The anal spinule of the dorsal series is shorter than in *A. stigma*, and this is true of the weaker thoracic horns, which are more bent and arise with a greater slope forwards. The color is obscure greenish, mottled with black; an infra-stigmatal reddish stripe. Stigmata distinct, much as in *D. stigma*. The anal segment has but one small spinule. Enters the ground to pupate.

4. *Dryocampa rubicunda* Fabr.

Larva light green, with longitudinal stripes of a darker shade. The spinules have disappeared and this is evidently the lowest form in the group, the larva commencing to look like that of some of the lower moths. The black horns on segment 2 are retained, as also dorsal spinules on 11 and 12; a pink stripe laterally, the head is discolorous; the stigmata concolorous and concealed, not prominent and discolorous as in *Anisota*. But the narrower larva is otherwise quite similar. Enters the ground to pupate. On oak, maple, and a number of trees. I regret not to know the larva of var. *alba* Grote, which would be interesting to compare. As the variety is common, it will doubtless soon be described. Hübner, with an eye for the general appearance and structure of moths, calls this group

communiformes; I fancy he meant by this that the moths approached the *Noctuidæ* in their proportions, that the body was heavy and longer than the wings. I may be wrong in this. The moths are interesting to me, as I have long ago said, from the curious way in which the pattern of the upper surface of hind wings is reproduced on primaries beneath; this is also the case in the *Noctuidæ*. I have said it is as if the pattern of one were photographed on the other; we have an approach to this in the *Smerinthinæ*, in which the under side of fore wings is often rosy. This is seen more or less in all moths in which the wings cover each other in a state of rest; therefore not in the *Geometridæ*, not in the Butterflies. The *Ceratocampinæ*, which Grote and Robinson, in correction of Packard, separate from the Saturnian genera *Hemileuca*, etc., are an American subfamily of *Bombyces*, probably the descendants of an old type more intimately connected with the Hawk Moths. The eye spots of *Smerinthus* are re-called, the rosy disc of the secondaries is here repeated. The group is probably South American in its origin. It has a feeble but beautiful representation in North America.

B. Description of an Unknown Larva belonging to the Geometridæ.

A small colony of nearly full grown larvæ were observed on *Syringa vulgaris*, the common lilac, on September 16th, on Staten Island. The total length extended was then 30 mil. The head was small, the thoracic segments narrowing anteriorly. The two jointed antennæ were provided with a bristle at the extremity of the second joint. Two pair of abdominal or false feet. From the 4th to the 7th segment the body was enlarged and somewhat flattened, the segments provided with a rounded lateral prominence and with a dorsal transverse ridge showing small yellowish points on each side, from the inner edge of which points sprang a single hair. The latter characters were shared by all the abdominal segments. The 7th to the 9th segments showed a pale yellowish lateral patch, below which the ventral protuberance was flecked with the same color extending along the abdominal legs on the latter segment. A more elevated dorsal hump on the anal segment, consisting of two protuberances; from the apex of each is emitted a single short bristle. This seems to recall a stage in the development of the caudal horn of the *Sphingidæ*. The whole body seems naked, but two isolated hairs or bristles are seen to arise subdorsally along the segments. The head is sparsely hirsute. The general color of this singular larva is dark wood brown, marbled dorsally with a

paler shade. The whole larva looks like a withered leaf. When discovered the little colony were hanging head downwards, supported by the two abdominal feet, and giving themselves a slight swaying motion with the free portion of the body (not unlike that we see in some pendulous pupæ), the resemblance to a dead, half-fastened leaf, preparing to fall with each stronger gust of the autumn wind, was heightened. My attempts to rear the colony were frustrated by their escape, and before a drawing could be made, which I intended. Belonging probably to the *Ennomidæ*, these larvae were remarkable for their mimicry of dead leaves. The larvæ of the *Geometridæ* are often very interesting from their bizarre forms and singular ornamentation, which, of all the groups of moths known to me, most nearly resembles that of the curious forms among the higher Butterflies.

C. Two Gray Species of Lithophane.

For the synonymy of this genus see *Grote*, Check List, p. 38, 1876. It is called incorrectly *Xylina*, whereas *Xylena*, Hübner, has for type *Hadena lithoxylea*. These little *Noctuidæ* hibernate in the moth state, inhabiting the north temperate regions. We have a number of species, among which are two purely light gray forms, *L. fagina* Morr., and *L. Georgii* Grote, besides the darker gray and stouter series of *L. antennata* Walk., *L. laticinerea* Grote, and *L. Grotei* Riley (=*cinerosa* Gr., n. b. l.), and which series is considered varietal by Professor Riley, and one of distinct but nearly related species by myself, I first separating and describing them.

Lithophane fagina Morr.

This species differs by the obsolescence of its markings, which gives the primaries a somewhat narrower appearance, and recalls those of *Cucullia*. A white shade, more purely white and more extended than in any other species of the genus, extends along costa to apical third. The customary markings are lost or barely indicated by hair streaks of black scales. The veins are marked finely in black. The series of cuneiform marks forming the subterminal line can be faintly made out on the shining gray concolorous wings; the stigmata are lost; hind wings pale smoky gray with whitish fringes, reflecting the irregular smoky mesial band and thick discal mark from the under surface, which is paler than

above. On the darker fore wings beneath the spot and band are more faintly repeated. Head and thorax concolorous dark smoky gray, paler beneath; abdomen like secondaries. Not rare. Canada to Middle States. Larva unknown. Hibernated specimens are found in April and May; the fresh examples may be taken in October.

Lithophane Georgii Grote.

Differs by its warmer and darker gray color; the pale costal shading of primaries is confined to the shoulder of the wing; the black angulated median shade is diffuse and evident; the veins more evidently black marked; the subterminal line is distinct, and the customary black basal ray is to be plainly seen. Beneath the mesial smoky band on the whitish gray secondaries is wavy, being roundedly indented on the disc, and this character is very evident on comparison, its course being straight without prominent inflection in *L. fagina*. Mrs. Fernald sends me this species from Maine; the type was collected by Mr. George Norman, in Canada.

D. On Parorgyia Clintonii.

This northern form is allied to the southern *leucophaea* of Abbot & Smith, but one or two specimens from Georgia and Alabama were evidently different, or suggested a rather wide variation. The *achatina* of Harris and Packard is not Abbot & Smith's species, but is based on specimens belonging to *Clintonii*. The moth described by Dr. Packard as *Platycerura furcilla*, is apparently related to this group, resembling the European *Dasychira pudibunda*, but of a more compact, noctuid-like form. Its name is a misnomer, as it is in no wise like *Cerura*, where it is placed by my old friend Dr. Packard, in whose monograph, admirable for its arrangement of the groups, the genera with furcate anal extension in the naked larva are brought near the group where the anal extension is undivided, evidently correctly. The larva of *Platycerura* is, however, hairy, as described by Lintner and Thaxter, and resembles the larvæ of the *Apatelinæ*, where I have placed the genus, I think correctly. None of the European genera examined by me appear identical with *Parorgyia*, which genus seems an extension of *Orgyia*, in which the female is winged and the whole form in both sexes stouter.

NOTES ON THE LOCUSTIDÆ, WITH DESCRIPTION OF A NEW SPECIES.

BY WM. T. DAVIS, STATEN ISLAND, N. Y.

Whether they fill the listener with a train of happy thoughts, as Gilbert White says, or whether they produce a sadness because the days of summer are nearly gone, as Dr. Harris asserts, the songs of crickets and other Orthoptera have, nevertheless, the merit of always being interesting. An insect that can sing—that has something to say—even though it be the same, night after night, enjoys a sort of individuality, and this long discussion of the Katydids and the quiet murmur of the tree crickets, constitute one of the chief charms of our summer evenings. But they do not always sing or stridulate quite alike, and sometimes, too, their shrilling apparatus is slightly deformed or injured, producing some curious sounds when in use.

I once heard a Katydid whose singing apparatus was out of order, and the sounds given forth contrasted strangely with those of a rival male in an adjoining tree. *Amblycorypha retinervis* produces two somewhat different songs, or perhaps more correctly, varies the same song in time or extent of utterance, so that unless the same individual is listened to for some time, the notes might be attributed to different species. This insect often lays its eggs on the honeysuckle, and I once observed a female on the 16th of Sept., ovipositing on a low tree by the road side, gradually biting the bark into a ridge, along which the eggs were laid, tile fashion.

On Staten Island, the first Conocephalus that is heard in the garden is *ensiger*, and with *ik-ik-ik*, as if sharpening a saw, enlivens low bushes and particularly the corn patch. This insect seems to especially delight in perching near the top of a corn-stalk and there giving forth its rather impulsive song. I have often watched one crawl, with many a spiral turn, up the stem, fiddling all the while. My notes on its first heard stridulation show considerable uniformity, and the average date may be taken as July 15th.

Conocephalus dissimilis is more of a low grass and weed loving insect than *C. ensiger*, and also comes later in the season. I have found this insect stridulating when its head was gone, picked off perhaps by some

vagrant chick. The brown colored specimens are much more common in this species than in *ensiger*.

Conocephalus robustus resides for the most part mid the grass on sandy ground near the sea shore, though an occasional individual finds its way inland. Along the sea beach they stridulate in early afternoon, especially if slightly cloudy, and when approached they have a curious fashion of dropping to the ground. I have often found them, on such occasions, actually standing on their heads in the soft sand, leaning against the grass stems which grow so close together, without in any way holding on to them. Whether this position is intentional or not, I cannot say, but certain it is that when looked for from above they offer the smallest extent of their bodies to view and may thus escape many enemies.

I have found another Conocephalus on Staten Island, mid the cat-tails that grow on the salt meadows, and a specimen sent to Mr. Samuel H. Scudder was considered by that gentleman to be an undescribed species. This insect keeps very close to the ground, hiding well in the vegetation, and is not easily discovered. The sound produced when stridulating is very faint, not louder than that made by *Gryllus abbrinatus*, and I was much surprised to hear such a faint song come from so large an insect. I have, in consequence of this faint song, named it the "slightly musical" Conocephalus.

C. exiliscanorus. A large species, brown or green, the tegmina in the brown specimens irregularly dotted with fuscous spots. Fastigium long, moderately pointed, bent downward at apex, slightly flattened and scabrous above with medial groove or depression, depending tooth at lower base of fastigium pointed. Pronotum scabrous. Tegmina moderately broad and slightly falcate. Hind femora with numerous spines beneath, the other femora with only an occasional abortive spine near tip.

Length of body (including head), 37 m.m.; of fastigium beyond front edge of eyes, 5 m.m.; of pronotal disk, 9 m.m.; of tegmina, 40 m.m.; of hind tibiae, 21 m.m.; 2 ♂.

This insect is allied to *C. ensiger*, but readily distinguished by the longer fastigium, the entire under surface of which, with the exception of the basal fourth, is of a deep shining black.

DISSOSTEIRA CAROLINA.

BY JEROME M'NEILL, MOLINE, ILL.

During the past summer I collected at Dublin, Wayne Co., Ind., a number of *Œdipodini* that seem to be a long-winged variety of the above named species. A comparison of the dimensions given by Thomas and Saussure for *D. carolina* and *D. longipennis* with measurements taken from eleven of these specimens, will show what the difference amounts to. The former, in his Acrididæ of North America, page 118, gives for *D. carolina* the following dimensions: "Female—Length, 1.5 to 1.75 inches; elytra, length of the body; posterior femora, about half the length of the body. Male—Length, 1 to 1.25 inches; elytra and wings passing the abdomen about one-third their length." The same authority gives for *D. longipennis:* "Length, 1.14 inches; elytra, 1.27 inches; posterior femora, 0.64 inch; posterior tibiæ, 0.55 inch." These dimensions are those of the male, the female being unknown to Thomas.

Saussure, in his "Prodromus Œdipodiorum," pages 137 and 138, gives for the measurements of the first named species: "Length, female, 40, male, 33; elytra, female, 41, male, 36 mill." And for the last mentioned species: "Length, female, 45, male, 35; elytra, female, 46, male, 35 mill."

It appears from these facts then that while the length of the body is greater in *D. longipennis*, the wings are proportionally longer in both female and male of *D. carolina*, and absolutely longer in the male of this species, so that the latter is, in spite of the name, the long-winged species. But the Dublin specimens exhibit a much greater contrast in the relative lengths of the elytra and bodies, as a glance at the following table will show:—

No. 1,	female,	length,	34;	elytra,	41;	posterior	femora,	17;	posterior	tibiæ,	14	mill.
No. 2,	"	"	37;	"	40;	"	"	17;	"	"	15	"
Average	"	"	35.5;	"	40.5;	"	"	17;	"	"	14.5	"
No. 3,	male,	length,	27;	elytra,	33;	posterior	femora,	14;	posterior	tibiæ,	12	mill.
No. 4,	"	"	28;	"	34;	"	"	15;	"	"	12	"
No. 5,	"	"	27;	"	33;	"	"	14;	"	"	12	"
No. 6,	"	"	27;	"	32;	"	"	15;	"	"	12	"
No. 7,	"	"	30;	"	34;	"	"	14;	"	"	12	"
No. 8,	"	"	27;	"	33;	"	"	14;	"	"	12	"
No. 9,	"	"	28;	"	35;	"	"	15;	"	"	13	"
No. 10,	"	"	26;	"	33;	"	"	14;	"	"	12	"
No. 11,	"	"	29;	"	34;	"	"	14;	"	"	12	"
Average	"	"	27⅞;	"	33⅛;	"	"	14⅛;	"	"	12⅛	"

In the female then the elytra are 1.14 the length of the body, while in the male the elytra are nearly 1.21 the length of the body.

To present this striking difference to the eye then: In the Dublin specimens the ratio of the elytra to the body is, female 1.14, male 1.21; according to Saussure, female 1.02½, male 1.09; according to Thomas, about 1.

These specimens have in several cases the black portion of the wings more or less distinctly fenestrated. This marking is particularly distinct in one specimen on the basal third of the wings. They all have two pale bands on the inside of the femora. The elytra extend beyond the body from .32 to .44 of their length.

NOTE ON THE SAW FLY, HYLOTOMA DULCIARIA, Say.

BY THE REV. T. W. FYLES, SOUTH QUEBEC.

On page 38 of the February number of last year's ENTOMOLOGIST, is a note, written by myself, concerning an injurious Saw-fly larva which had appeared in abundance in the neighborhood of Quebec. I preserved quite a number of the cocoons of the species, hoping to obtain the perfect insect from them. Some of the cocoons were kept in a box in my study, others in a tin case placed in the cellar, and yet others in a glass jar half filled with moist earth. It was from the last lot only that I met with a successful result. In July last two imagos presented themselves. The insect in its perfect state is of sluggish habits. Its head and wings are purple; its thorax and abdomen yellow. It is about one inch in expanse of wings. Knowing that Mr. Harrington had given much attention to the Hymenoptera, I brought the insect under his notice, and he was able to identify it as *Hylotoma dulciaria*. The description of the insect given by Norton is as follows:—

H. DULCIARIA.

Hylotoma dulciaria, Say. Long's Second Exp. II., 1824, 314, ♀. "Pale rufous; head, wings and feet violaceous black." Length 0.34–0.48. Br. wings 0.74–1.04 inch.

♀. Antennæ black, with a violaceous tinge; nasus emarginate, short; head, a spot on pectus and ovipositor sheaths blue-black, remainder of body testaceous or yellowish-red; legs steel-blue; spines same color;

inner spines rather blunt; wings violaceous, sub-hyaline, less obscure at apex, a large darker spot below stigma covering marginal and the upper half of all the submarginal cells; under wings with but one middle cell.

Maine, N. Hampshire, Connecticut, New York, N. W. Ter. (Say), Illinois, English River (Smithsonian Institution).

This is probably the same with *H. pectoralis*, Leach, from which it differs only in the color of the wings and the black ovipositor sheaths, which Say calls the "tail black."

Cat. of the Tenthredinidæ and Uroceridæ of N. Am., by Edward Norton, from Trans. of Am. Ent. Soc. 1867-9, page 40.

It was not till the first week in August that the insect appeared in its natural haunts. At that time I found, along the St. Louis Road, great numbers of the flies which had been trodden under foot by the passers by. These flies were somewhat larger than those I had succeeded in raising; but there could be no doubt as to the identity of species. This autumn the larvæ have been again abundant, but not more so, as far as I can judge, than they were last year.

THE COCCIDÆ IN THE MUSEUM OF COMPARATIVE ZOOLOGY, CAMBRIDGE, MASS.

BY DR. H. A. HAGEN.

Having newly arranged the Coccidæ of our collection, which have been named by Prof. J. H. Comstock, I compared them with the Professor's Catalogue for 1883, and ascertained the presence of two-thirds of the 168 numbers enumerated. I find that only 27 N. Amer. species are wanting. Among the insects received in the collection of the Peabody Academy is *Lecanium tiliæ*, A. Fitch, from Mt. Carroll, Ill., by Mr. Shimer, very probably identical with A. Fitch's species, and *Lecanium tulipiferæ*, Cook, by typical specimens. A certain number is not yet determined, also the later accessions have not been put in the collection. There are some European types of importance. Two of Prof. Ratzeburg's are not published; *C. variolosus* is believed by Prof. Comstock to be the No. 122, *A quercicola*, Bouché; the other is *C. conchatus*, both from the European oak. I am always eager to make the collection of this family more complete. Perhaps it is not out of place to say that the Phytoptocecidia in the collection has been enlarged by European and American species.

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THE LARVA OF LIPHYRA BRASSOLIS PROBABLY APHIDIVOROUS.

BY REV. W. J. HOLLAND, M. A., PH. D., PITTSBURGH, PA.

Some two years ago I received from Rev. L. C. Biggs, H. B. M. Chaplain at Penang, a parcel of insects collected by Mr. F. G. Durnford in Sungei-Ujong. Among them was a specimen the envelope containing which was labelled *Charaxes Durnfordi*, n. sp. Mr. Biggs, in sending the lot, called attention to this particular specimen in his note, saying: "It looks as if it were covered with mildew, which Durnford assures me is really fluff detached at the time of its capture." I did not examine the specimen very particularly at the time of its receipt, except to note that it was covered with a whitish mealy deposit, particularly thick upon the abdomen, and that it was not a *Charaxes*. Some three months or more ago I undertook the task of expanding this lot of insects and arranging them for my cabinets. I found, as I was putting the envelopes into the pans to relax them, several which contained specimens of a large "mealy bug." These were laid aside. At last I came to the alleged "*Charaxes Durnfordi*." What was my delight to find it to be a fine large female of *Liphyra brassolis*, Westwood. I had just received from Mr. W. H. Edwards a copy of his most interesting paper upon the habits of the larva of our *Feniseca Tarquinius*, an insect revealing very close relationship to the gigantic *Liphyra*, alike in the form of its wings, their neuration and their color. The true explanation of the "fluff" or mealy deposit upon the abdomen and lower side of the wings of the specimen instantly flashed upon my mind. I hastily looked up the envelopes containing the scale insects or "mealy bugs." A comparison beneath the microscope of the white particles clinging to the abdomen and lodged upon the wings of the *Liphyra*, with the mealy covering of the shield lice preserved in the envelopes, revealed their identity. I mentally put the two things together and conclude:

a. That Mr. Durnford captured this specimen of *Liphyra* near a colony of scale insects, which was so large as to attract his attention and lead him to put a few of them into papers.

b. That this female was engaged in oviposition just before she was captured by Mr. Durnford, and that the mealy white deposit which Durnford spoke of as "fluff," which Mr. Biggs compared to mould or mildew, is nothing else than fragments of the white covering of the scale insects, over and among which the butterfly had been flying while engaged in the act of laying her eggs.

If my conclusion is correct, and it seems to me that there can be no question of its correctness, we have a second species to add to the list of those Lepidoptera, the larvæ of which are carnivorous, or aphidivorous, or coccivorous, as the reader pleases.

Light is also thrown by this discovery upon the generic relationship of *Feniseca* and *Liphyra*. The two are brought together into the same group. The classification of the Lycaenidæ of the world is as yet not fixed upon a final basis, but we are gradually reaching just conclusions. For my part, I would fail to agree with the assertion of my good friend, Mr. Edwards, to the effect that *Feniseca* is to be referred to the Erycinidæ. The formation of the legs, the neuration, the shape of the antennæ and of the chrysalis, is such as to convince me that no mistake has been made in putting this genus among the Lycaenidæ. The fact that the larva presents points of difference from the larva of such a species as *L. Pseudargiolus*, or *Chrysophanus Americana*, should not weigh as against these other points in fixing the generic relationship.

NATURAL HISTORY NOTES ON COLEOPTERA—No. 3.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Cicindela punctulata Fab. The Cicindelas are generally regarded as diurnal, many of them appearing only during the hottest sunshine and disappearing if there comes but a cloud. In one respect *punctulata* is an exception, for while it flies by day like the others, it is occasionally (if not habitually) a night-flier. Several times late in summer it has been taken on my table at night, attracted by the light, and last autumn in a house in

the outskirts of the city I took in this way a couple, and was told that what was considered the same insect was a frequent visitor. This habit I think is not unknown.

Anisodactylus (Xestonotus) lugubris Dej. is frequently confounded with *A. Harrisii*, both species being often found together, and their size and general appearance the same. *Harrisii*, however, has two setigerous punctures at each side of the epistoma, while *lugubris* has but one; so that if this is remembered, a glance will separate them. There is a short description of this species in the Trans. Am. Phil. Soc., N. S., Vol. x., p. 343; and recently the female has been well described by Lieut. T. L. Casey, Contributions, etc., part 1, p. 9. under the name of *Harpalus Manhattanis.*

Pinophilus. The described species of this genus are five in number. One of these *(densus)* is Californian; the others belong to the South Atlantic and Gulf, with extensions into the Middle States. *P. latipes* occurs here sparingly, but is not recorded further north; it is variable as to its habitats; I have taken it in damp alluvial places under drift, under stones on dry hills, and under the damp bark on fallen timber. Mr. A. C. Reisig, of New Orleans, La., who finds this species, as well as *picipes*, *parcus* and *opacus*, abundantly, states that they occur mostly in wet places around a small species of Palmetto, between the sheathing leaves of which they often crawl when the weather is cold, and are taken less often under the loose bark of trees, which he thinks is too dry for them. Mr. T. L. Casey took two of the species "in damp earth under decomposing vegetable matter, and in a few instances under stones;" two other of the species were "attracted at night to electric lights at El Paso, Texas." (Cal. Acad. Sci., Bul. 6, p. 262.) From the above it will be seen its habitats are various and are probably all used merely for shelter; and this does not materially conflict with the statement in the Classification, p. 99, that the species are "found under bark of trees." That, and similar statements elsewhere, are to be taken only in the widest sense and are correct enough for all practical purposes. It does not live in the ejectamenta of animals, nor in putrid animal matter. The specimens of *P. latipes* found by me under bark seemingly fed on an abundant liquid of decomposition found there, and such substances, with small larvæ, crustaceans, etc., probably constitute their food.

Amphicrossus ciliatus Oliv., *Europs pallipennis* Lec., *Bactridium cavicolle* Horn. The first of these was taken plentifully and the others

sparingly in April and May at sap on the stumps of black walnut, under chips. Black walnut cut from January to April produces on northern exposures a flow of sap until June, and by the judicious placing of chips, all the insects that delight in putridity may be taken, and their number is great. If the surface of the stump be hacked unevenly, the minute species will be found in the cracks of the undetached chips. Birch cut in the same way might do as well, as it flows sap abundantly and for a long time.

Pallodes (silaceus) pallidus Beauv., so abundant in many species of mushrooms, is here entirely pallid, some specimens having the elytra a little infuscate at the sides. As it occurs in Florida it appears so different as not to be readily recognizable by those acquainted only with the pale form. The head is pale; the thorax has the disk dark piceous, becoming paler to the margin; the elytra vary from dark piceous to castaneous, the whole upper side being highly polished and iridescent. From Dr. Horn's description of this species in his monograph of the family, one is scarcely prepared for such extremes in colour variation, as this is not greatly emphasized.

Betarmon bigeminatus Rand. Collectors desiring this pretty little species can beat it sparingly from spruce growing in open places, from June till August.

Clœotus aphodioides Ill., is found in early spring (till May) under the bark of dead standing trees not yet separated from the wood—notably oak; last April (25th) I took more than one hundred individuals from one small tree, from two to eight being packed in one cavity and many of them in copula, as the day was warm; these beetles were not bred in the place where found, but came there to hibernate. They enter the tree through a hole in the bark that has served the previous summer for the exit of some wood-bred beetle—in the present instance *Urographis fasciatus;* they scoop out when necessary some of the borings of the original inhabitant between the wood and the bark, and in this excavation pack themselves closely, leaving the hole by which they entered open. Where their larval life is spent is unknown, but it would appear to be under ground, as many—nearly all—of the beetles had the deep submarginal groove of the elytra filled with white dried mud, giving them the appearance of being surrounded by a pale cincture. Of the other species *(C. globosus)* I have found but a single individual; the principal differences between the two seem to be that in the latter the punctures of the striae are not so close and the margin of the elytra serrate. Should it be found in numbers these

differences might be overcome, as some of the individuals of *aphodioides* have the margin semi-serrate, and the punctures of the striæ nearly as far apart, and a corresponding approximation of the other species in the other line would about cause them to meet.

Nicagus obscurus Lec. The position of the genus of which this species is the only known representative has been a matter of no little discussion by systematists; to some it is a Lucanide, while others—among them the authors of the Classification, find the Scarabaeidan characters to preponderate. See Jour. Acad. Nat. Sci. Phil., 2 s., v. 1, p. 86; and Classification, p. 245.

April 23rd of last year, I took 63 specimens, five only of which were females; these with one exception differed greatly from the other sex in size and appearance, being much larger, more convex, less hairy and with the elytra evidently striate, resembling some *Sericea*. The exception, however, differed chiefly from the males by its shorter tarsi and stouter tibiae. In death the joints of the antennal club are mostly open, but in life they seemed capable of being closed contiguously, though the want of a lens prevented me from verifying this absolutely.

They were all taken on the margin of a creek on a deep deposit of loose, white sand, left on the recedence of the spring flood. The day was very warm, and they were first noticed about 3 p.m. coming seemingly from an adjoining pasture ground, and disappearing suddenly in about an hour on the sun clouding over. They flew very slowly, circling around close to the sand as if in search of something, and alighting in tracks and indentations, they were easily picked up. Just why they resort to sand deposits is not understood; it may be for sexual purposes, but if so they cannot live there in the larval state, because these sand beds are swept away by every overflow; it may be for warmth (as in the case of *Cotalpa lanigera*, several specimens of which I took there that evidently came for the heat), but others have observed them doing the same thing in the heat of midsummer; or it may be in search of decomposing shell fish, but there were none there, and in fact it is not proven that the larvæ live on decaying animal substances, though once found near dead *Unios*, and in the light of other facts I would say such is improbable, were it not that long ago I adopted the motto "*Festina lente*," in deciding adversely to the opinions of accurate and distinguished observers. The species seems widely distributed in the Atlantic States, from Michigan southward,

though few collectors have been fortunate enough to find it more than once. He who shall make known the manner of its life will have done something for science.

Mantura floridana, Cr. The difference in colour between the specimens found here and in Florida is very noticeable; here it is a rufous brown colour above, with the apical third of the elytra paler, the colour insensibly fading into that of the disk without much contrast. There it is larger, piceous black, apical third pale whitish, with the separation of the colours sharply defined, very much as in *Cercyon prætextatum*. The characters are the same, though they look enough unlike to be different species.

Mesites subcylindricus Horn. I took here a pair of this and would have had difficulty in recognizing with certainty the female had the male not been present. The male described by Dr. Horn was probably above the average size, .26 inch. I have two, measuring .18 and .23 inch.; and a female .22 inch. The male and female differ greatly in the appearance of the beak; in the female it is longer, strictly cylindrical, highly polished, a little dilated at apex, impunctate except a few coarse punctures at base, where there is also an elongate impression and a puncture between the eyes, which are small; the antennæ are inserted so close to the eyes as to be sub-contiguous, and the scrobes are obsolete. In the male it is as described by Dr. Horn, in substance, round, flattened above and below, dilated over the insertion of the antennæ, a short canaliculation near base, a puncture between the eyes, and surface apparently longitudinally strigose, with fine shallow punctures; antennæ slightly post-median. It seems rare.

Cnesinus strigicollis Lec. Occurs here occasionally on Osage Orange, which it probably followed from the south.

A GORDIIDIDE FOUND IN BRASSICA OLERACEA.

Whether the individual alluded to is a *Gordius*, or of some allied genus, my limited knowledge of the *Annelida* does not permit me to determine. In September a German gardener brought to me what he called a "cabbage snake, a dangerous thing full of poison," the bite of which he veraciously assured me he had known in Germany to produce a "felon." He had taken it from the middle of a head of cabbage which he had split open. It was entirely white (the color of the cabbage), as

thick as a common knitting needle, and twenty-three inches long, as nearly as it could be measured. I kept it in a 4-ounce bottle in hydrant water, which was changed occasionally. It amused itself by looping into all sorts of complex knots, and again straightening out, but so slowly that its movements were tedious to observe. With age the colour faded to pale yellow. It lived till March, when unfortunately I supplied it with boiled water (cold, however,) from the hot water spigot, and when I observed it again it was lifeless, and had turned brown. It is now in alcohol. This occurred three years ago, and I was promised more specimens, but till date none have come to hand. My acquaintance with *Gordius* is limited to the statements found in works of entomology, where it is alluded to as parasitic only on insects and spiders. Though not strictly entomological, a paper from some one acquainted with this family would prove very instructive.

TEXAN FORFICULIDÆ.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

Only seven species of this family of Orthoptera are as yet known from Texas. More species must occur along the southern border, but so little attention has been paid to this family that it may be long before the fauna is fairly well known. Perhaps the publication of this list may help to swell the number. One species is described more fully than ever before for readier identification. All the species mentioned are briefly characterized in a synopsis of the N. American species in the Bulletin of the U. S. Geol. Surv. Terr., vol. ii., p. 249.

Labidura riparia (Pall.) A single specimen, from the collection of Mr. Uhler, was collected in (western?) Texas by Capt. (now Gen.) Pope, March 10.

Spongophora brunneipennis Serv. A common species, apparently, in all parts of the State. Mr. Belfrage has taken it at Clifton, and also in other parts of the State. Mr. Boll found it not uncommon at Dallas. Immature specimens were taken by him Feb. 17, and mature in bottoms on Feb. 23 and Aug. 19. This species is the *Forf. flavipes* of Schaum MSS., under which name I formerly distributed some specimens. I append a description drawn up from more than twenty specimens, mainly from Texas and Florida.

Head depressed next the hind border, elsewhere tumid, smooth, shining, blackish castaneous; the labrum, neighboring parts and palpi luteous, the basal joints of the outer maxillary pair obscured a little with fuscous; antennæ 14-15 jointed, luteous, a little tinged with brown beyond the base.

Pronotum as broad as the head, scarcely longer than broad, the sides and posterior border scarcely convex, posterior angles rounded, lateral edges a little marginate; surface of the color of the head, scarcely paler at the sides, slightly wrinkled, but otherwise smooth, flat on posterior half and sides, the rest a little tumid; a sharp median impressed line. Tegmina of the same color, nearly twice as long as the pronotum, slightly and broadly emarginate at the tip, slightly produced next the inner edge. Exposed part of wings nearly half as long as tegmina, honey yellow, with a broad inner and apical belt of dark castaneous, almost or quite as black as the tegmina; the extreme edge dull luteous. Legs uniform honey yellow.

Abdomen with nearly parallel sides in the male, a little convex in the female; dark, rich castaneous or mahogany brown, much obscured with black, especially on the sides, at the incisures and down the middle, and excepting the clearly colored terminal segment, distinctly punctate, less deeply on the terminal segment; lateral plications of second and third segments rather slight; last segment quadrate, twice as broad as long, with parallel sides, depressed in a triangular space next the posterior border (♂), or tapering a little, with a median longitudinal depression (♀), at the bottom of which is a slight longitudinal depressed line. Pygidium of female hardly extended, moderate in size, quadrate; of male large, triangular, with laterally produced angles, and a more or less broadly truncate apex, often laterally and concavely excised, the whole broader than long.

Forceps of female about half as long as the abdomen, simple, straight, horizontal, incurved at tip, pretty strongly depressed, bluntly pointed, the superior inner edge with a quadrate, laminate, depressed, blackened basal tooth, much broader than long, and followed, after a brief space, by a series of minute tubercles nearly to the tip; inferior edge blackened, minutely tuberculato-denticulate, the base largely and obliquely excised. Forceps of male slender, nearly two-thirds as long as the abdomen, horizontal, scarcely incurved, excepting at the rather bluntly pointed

apex, depressed, especially on the apical half, bluntly carinate on outer edge, inner edge arcuate, excised as far as the triangular, sharp, rather prominent tooth on the middle of the basal half; beyond, and sometimes previously, minutely tuberculate in a double series nearly to the tip.

Length of body, male, 8.5–11.25 m.m., female, 8–11 m.m.; of antennæ, 5–6 m.m.; of tegmina and wings, 4–4.25 m.m.; of hind femora, 2.1–2.4 m.m.; of forceps, male, 3.5–4.75 m.m., female, 2.5–3.5 m.m.

Forficula tæniata Dohrn. I have seen a pair of specimens from Mr. Uhler's collection, coming from Texas.

Forficula exilis Scudd. The only specimen known comes from Texas (P. R. Uhler).

I have also another Texan species of *Forficula* from Mr. Uhler's collection, but it is immature.

Labia guttata Scudd. Three specimens were taken by Mr. Belfrage in Bosque county.

Labia minor (Linn.) This widespread species has reached Texas, and is abundant there. Mr. Belfrage has taken many mature specimens in June and September at Clifton.

Labia melancholica Scudd. The single specimen known was taken by Mr. Belfrage (at Waco, or near Austin) on Feb. 24th.

PARTIAL LIST OF CAPSIDÆ TAKEN AT BUFFALO, N. Y.

BY E. P. VAN DUZEE.

For the last two seasons I have turned my attention more particularly to collecting the Hemiptera; and very naturally became deeply interested in the family of the Phytocoridæ, or Capsidæ, as they are generally called. They are the most distinctively northern family of the Heteroptera, as the Jassidæ are of the Homoptera; but they seem to have been neglected by European as well as American Entomologists, probably because of the variability of the species, and their frail structure which makes them difficult of preservation. The literature of the Capsidæ, though perhaps not as meagre as of the Jassidæ, is widely scattered and fragmentary as regards American species, and makes this a difficult family to study.

The species mentioned below have, with few exceptions, been taken with the sweep-net from grass, weeds, or low bushes, in open fields and

borders of woods and streams, within a radius of twenty miles from this city. I have marked with an asterisk such species as I have taken in Ontario, mostly at Ridgeway; but without doubt most of the species found here could be found on the Canadian side of the river.

* *Brachytropis calcarata* Fall., May to Aug. In damp situations.

* *Trigonotylus ruficornis* Fall., June and July. Not common.

* *Miris instabilis* Uhl., *M. affinis* Reut., May to Aug. Common in dry fields. The dark fuscous form is rare here. Some beautiful green examples taken at Ridgeway, Ont., May, 1886.

* *Leptopterna dolobrata* Linn., May to Aug. In dry fields. Probably our most abundant Hemipter. It attains full development about June 1st, and frequently appears in immense swarms in favorable localities.

* *Trachelomiris oculatus* Reut., June to Aug. Rare.

* *Trachelomiris Meilleurii* Prov., *Nabidea coracina* Uhl., June to Aug. Common in open rich fields.

Resthenia insitiva Say. One example of the form with black scutellum, taken July 4th, 1879.

Lopidea media Say, July, common. A few examples of the yellow variety, named *C. robiniæ* by Mr. Uhler, taken in July, 1885.

Phytocoris eximus Reut., July and Aug.

Phytocoris tibialis Reut., July and Aug. A handsome species, occurring in considerable numbers among rank weeds, near water.

Phytocoris pallidicornis Reut. One example taken at Colden, N. Y., July, 1885.

Phytocoris scrupens Say, June and July. Very variable. The most abundant form here is the pale or ochreous variety, generally taken on the Staphylea. One example of the typical form described by Say was presented to me by Mr. Ph. Fischer, who took it near this city, and with it another variety which may prove to be a distinct species; it has the pronotum black, with the narrow edge, and three longitudinal vittæ ochreous, and differs slightly in other respects from the ordinary forms of *scrupens*.

Phytocoris colon Say. Three examples taken in Aug., 1886. This species was described by Mr. Say in 1831, but seems to have been overlooked by later Entomologists until 1884, when M.

Provancher took it near Quebec. The present examples add a third locality where this interesting insect has been captured. As collectors turn their attention more to the Hemiptera, it will doubtless be taken in most of the Northern and Middle States.

Neurocolpis nubilus Say, July and Aug. Most abundant on sumach.

Dichrooscytus rufipennis Fall., July. Rare.

* *Calocaris rapidus* Say, June and July. Very common on flowers of the Compositæ.

Megacœlum fasciatum Uhl., July. Rare.

Lygus pabulinus Linn., July and Aug. Variable in size.

* *Lygus pratensis* Linn., June to Oct. Abundant.

* *Lygus flavomaculatus* Prov., *L. strigulatus* Walk., May to Oct. Very common.

* *Lygus invitus* Say, June to Aug. Another common species.

Lygus monachus Uhl. Rare. Kindly determined for me by Mr. Uhler.

* *Coccobaphes sanguinarius* Uhl., July and Aug.

Pœciloscytus basalis Reut., June to Sept. A very common and variable species on *Ambrosia*, thistles, and other weeds, particularly in dry fields.

* *Pœcilocapsus lineatus* Fab. June to August. Common.

* *Pœcilocapsus goniphorus* Say. May to Sept. Very abundant and variable. *Var. C.* Say and *Var. F.* Reut., seem to represent the two extremes as found here.

* *Pœcilocapsus dislocatus* Say. June. Not uncommon, and by Mr. Uhler considered as a variety of the preceding.

Pœcilocapsus affinis Reut. June. Rare.

* *Pœcilocapsus marginalis* Reut. June and July. This might easily be confounded with *var F.* of *goniphorus*, but on close comparison is readily distinguished by the several characters given by M. Reuter *(Capsinæ, Bor. Am., p.* 75.)

Systratiotus venaticus Uhl. July.

Systratiotus americanus Reut. July and Aug. Swept from rank weeds in damp situations. Determined by Mr. Uhler.

Camptobrochis nebulosus Uhl. Rare.

Orthops scutellatus Uhl. Not common. Colden, N. Y., July, 1886.

Orthops pastinaceæ Fall. The present examples seem to agree in every respect with Douglass and Scott's description of this species

in their "British Hemiptera," and I feel but little doubt about the determination, although I possess no European specimens for direct comparison. I think this is its first reported occurrence in this country. It is not uncommon here on Umbelliferæ, especially *Conium maculatum* and *Heracleum sativum*, from May to July; and like the preceding species, is variable in color and marking.

* *Capsus ater* Linn. May to Aug. Abundant everywhere.

Monalocoris filicis Linn. July and Aug. Common on various ferns in deep woods. I have rarely taken it in open sunny places.

Sericophanes ocellatus Reut. Rare. Swept from grass in a dry meadow in June.

* *Ilnacora Stalii* Reut. July and Aug. Swept from coarse weeds in damp places.

Pilophorus bifasciatus Fab. July and Aug.

* *Pilophorus confusus* Kirsch. June to Aug. Not uncommon on pines and other trees.

* *Globiceps flavomaculatus* Fab. June and Aug. The macropterus form rare.

Garganus fusiformis Say. July and Aug. Generally taken in company with *Lopidea media* Say.

* *Stiphrosoma stygica* Say. June and July. Very common, especially on wild sunflowers.

Halticus bractatus Say. July. But one fully developed specimen taken. The undeveloped form common.

Halticus apterus Linn. July. Common.

* *Idolocoris famelicus* Uhl. May to Aug. Not uncommon.

Idolocoris agilis Uhl. July and Aug. Not uncommon. Most of the specimens which I have examined have the pronotum and scutellum entirely black. Occasionally an example occurs with the yellow markings as described by Mr. Uhler.

Macrocoleus coagulatus Uhl. June to Aug. Dry dusty roadsides; swept from grass and low weeds.

Episcopus ornatus Reut. Two examples of this pretty little Capsid occurred to me while sweeping weeds near this city, July, 1885.

Plagiognathus obscurus Uhl. July. Abundant on various Composite flowers.

Agalliastes associatus Uhl. June to Sept. All the examples I have taken differ from Mr. Uhler's description in having the posterior femora mostly black. This, with many other species of Hemiptera, were kindly determined for me by Mr. W. H. Ashmead.

Agalliastes pulicarius Fall. Not uncommon at Colden, N. Y., in July. No other localities are known to me. It is a common European species; but seems not to have been heretofore reported from this country.

Agalliastes verbasci H. Schaf. June and July. Common on mullen.

Besides the 53 species enumerated above, I have taken 25 species in this vicinity which, through the want of the proper material, etc., I have as yet been unable to satisfactorily determine. The present list, although fragmentary, indicates an interesting field open to northern collectors; and we notice with pleasure an increasing interest in the Hemiptera, which have been for so long neglected.

SOME FURTHER NOTES ON PHYSONOTA.

BY F. B. CAULFIELD, MONTREAL.

On May 23rd of the past year (1886) I again found *Physonota helianthi*, Rand., on its food plant *(Helianthus decapetalus)* in the same locality as in the previous year. The insects were now in the spring, or what I would call their nuptial dress, and were entirely of a bright golden green, with the exception of the margin, which is transparent with pearly reflections. In the fall dress the elytra are black, irregularly spotted with white, the thorax white with five black spots. In the spring dress the thorax is concolorous with the elytra, and bears *only three black spots, the anterior double spot being entirely absent.*

During the past summer I examined many specimens belonging to different colonies, and all were alike in this respect. They appeared to be much more lively than in the fall, creeping about the plants and pairing. A specimen taken in the hand, after a few feints, spread its wings and flew quickly to some shrubs a few yards distant. I brought home a pair taken *in coitu*, in the hope of obtaining eggs, but did not succeed, although they fed and paired freely in captivity.

On the 25th, they began to lose the bright golden green, changing to a dull yellowish green. As the bright green disappeared, the black top of the head became visible through the thorax, showing the double anterior spot of the form *5-punctata.* On dissecting specimens and removing the head, I found that the anterior spots are transparent, while the posterior spots being opaque, are not affected by seasonal changes of colour. In the nuptial dress the anterior spots are concealed by the bright green, giving a three-spotted form *(helianthi)*, but in the fall dress the black top of the head is seen through the transparent spots, producing the form *5-punctata.* On June 12th, I again visited the colony, and found several couples paired. Many of the females were gravid, but no eggs were found. All the beetles were in the nuptial dress. Visited it again on June 19th, with the same result. On June 26th, I tried again and found several groups of young larvæ, showing that I must have overlooked the eggs, although I had searched carefully for them. Some of the larvæ had moulted and the cast skins were on the leaves. As the larvæ were of two sizes, eggs had probably been deposited a week or two previous. All the larvæ were on the under surface, but had eaten holes through the leaf by which their presence could be easily detected. These young larvæ are of a paler green than when full grown, and the yellow stripes are not so bright and are broken up into spots, giving them a grayish appearance. Their presence on the under surface of the leaf, near its extremity, gave me a clue to the whereabouts of the eggs, and after a little further search I succeeded in finding them. They are deposited in an irregular cluster attached to the under surface of the leaf, about half an inch from the tip, just where it tapers off. The egg cluster is just the width of the narrow portion of the leaf, and is about the size of a pea. In general appearance it closely resembles a gall. In shape it is roughly pyramidal, the base being attached to the leaf. Its colour varies from green to pinkish brown, the colours generally appearing in blotches. The eggs are arranged in horizontal layers lengthwise with the leaf, the number decreasing to the apex. They are of a greenish white colour, elongate oval, smooth. They adhere strongly to each other and are surrounded by a tough covering or envelope, no doubt exuded by the female. The eggs are not so firmly attached to the enveloping substance as to each other, and can be detached with a little care. One cluster that I counted contained twenty-three eggs, and this, I think, judging from the groups of young larvæ, would be about the general number. When emerging, the larvæ either work their way out

between the covering and the leaf, or cut a hole through the side ; the former is, I think, the plan generally adopted, as I found many clusters partly separated from the leaf and slightly raised, but only a few with a hole cut in the side. The latter may perhaps be the work of a parasite.

July 10th.—Only a few beetles seen, but all were in the nuptial dress. Larvæ abundant.

July 24th.—Only one beetle seen, still in the nuptial dress. Larvæ of different sizes plentiful. Some full grown larvæ brought home at this date produced the beetle the first week in August, all in fall dress, black and white ; five black spots on thorax.

August 7th.—Nearly all the larvæ being about full grown, have scattered over the leaves. Found one group lately emerged and one egg cluster not yet hatched. Found three pupæ, one on under surface of leaf, two on upper, and one larva about to pupate on upper surface of leaf. Found one beetle in nuptial dress and one in fall dress. The former with three spots on thorax, the latter with five.

August 14th.—Found one beetle in nuptial dress ; those in fall dress becoming plentiful. Could find no fresh egg clusters. Larvæ of different sizes still on the plants.

August 21st.—Beetles in fall dress abundant, none seen in nuptial dress ; none seen pairing or moving about. A few larvæ still on the plants. Boxed five beetles for home observation.

August 26th.—Three of the beetles, 2 ♂, 1 ♀, taken in black and white dress on August 21st, have changed colour to dull green, with a slight showing of the bright, golden green of the nuptial dress. A larva taken on same date has given a dipterous parasite now in cocoon. This parasite emerged August 30th, but the wings did not fully expand. It belongs to the Tachinidæ, but I have no means of identifying it. It is rather smaller than a common house fly, and darker in colour.

August 27th.—The bright golden green showing more plainly on the three beetles ; the anterior spot on thorax being now a patch of bright green, and the white spots of elytra have almost entirely disappeared.

September 1st.—The three beetles entirely bright golden green ; three spots on thorax. The other pair retained the black and white dress unchanged, all being kept under the same conditions. None paired or ate anything, generally resting quietly on the sides of the box. All died before the end of the month.

September 18th.—A few beetles seen, all in fall dress. One larva found. This larva was brought home, but died before pupating.

October 9th.—Searched again for *Physonota*, but could fine none. Food plant almost entirely dried up and withered, so that the beetles had probably gone into winter quarters.

From these observations we may sum up the history of *Physonota* as it occurs in this locality somewhat as follows :—With the return of summer the beetles leave their winter quarters, in which dress I have not yet been able to ascertain, but by the latter end of May all are in the nuptial dress. They then pair, and through June and July deposit eggs, the bulk of these being laid during the former month. The larvæ when young are social, but when nearly full grown separate, pupating on the leaves. The beetles from these issue from the beginning of August to near the end of September ; the larger number appearing in August. These are all in the fall dress of black and white, and hybernate before pairing.

The places in which I find the species being rough ground overgrown with plants and shrubs, I have, so far, failed to find them in their winter quarters.

As three of the beetles changed from the black and white of fall to the nuptial dress while in confinement, we might expect to find them do so under natural conditions, but two seasons' observations seem to prove the contrary. Possibly in a more southern locality the species may be double-brooded.

BOOK NOTICE.

THE BUTTERFLIES OF NORTH AMERICA. By W. H. Edwards. Third Series, Part I. Houghton, Mifflin & Co., 4to., Boston. Price, $2.25.

It is with very great pleasure that we receive from our esteemed contributor, Mr. W. H. Edwards, the First Part of the Third Series of his magnificent work, "The Butterflies of North America."

The last part of Volume II. was issued in November, 1884. It is a matter of deep congratulation to all Lepidopterists that the talented author now sees his way to resume publication ; but we regret exceedingly to learn from a notice in Science, of 4th February, that to enable

him to continue his unselfish labours he had to sacrifice many of the valuable type specimens in his collection.

The Part which has just come to hand contains three plates and nine pages of descriptive letter-press. Of the former, which have been executed under the supervision of Mrs. Mary Peart, it is not too much to say that they are exquisite, and are all equal to the very best in Vols. I. and II.

Plate I., which is accompanied by a complete life history, illustrates *Colias Eurydice* Bd., var. *Bernardino* Edw., in all its stages, from egg to maturity, and also a female of var. *Amorphæ* Hy. Edw.

On Plate II. we have a life-like representation of *Argynnis Nitocris* Edw., male and female.

On Plate III. we find figures of *Argynnis Lais* Edw., a pretty little species (but belonging to the same group as *Cybele*, *Atlantis* and *Electa*), discovered in the Northwest Territories by Capt. Gamble Geddes, in July, 1883. The artist has been particularly happy in the coloration of this plate, especially so in catching the peculiar dull ochrey-brown tint which is characteristic of the female. Of most interest to Canadians, however, is the fact that although this species is abundant in certain parts of the Northwest Territories, easily accessible, and comparatively well settled, nothing is known of its preparatory stages. The eggs of the species belonging to the same group are easily obtainable by tying females over growing plants of violets. Surely some of the readers of the CANADIAN ENTOMOLOGIST have friends living in the Calgary District, or at McLean, where it is very abundant, who, even if not entomologists, would, were the scientific importance of the results placed before them, at any rate take the trouble to confine a few females in gauze bags over living plants, and send Mr. Edwards the eggs. There is very little trouble about this matter; living roots of violets can be sent by mail in a piece of oiled-paper, and will grow easily, if kept watered, in any of the tins used for canned vegetables (flower-pots are rare commodities in the N. W. T.) All that is necessary is to bend two pieces of wire so as to make a pent-house over the plant, and then placing a bag of muslin over the whole, secure it by means of an elastic band round the top of the can. This should be kept out of doors in a shady spot.

The importance of Mr. Edwards's studies on the Diurnal Lepidoptera of North America is perhaps hardly appreciated, until we remember that, with the exception of a few of our commonest butterflies, almost nothing

was known of their life-histories until he turned his attention to them in 1868. At the present time, however, it is far otherwise; for by close study, diligent care, and accurate observation, he has himself worked out the complete life-histories of a large proportion of the recorded North American species. Moreover, many discoveries of great interest have rewarded his constant efforts: The tri-morphism of *Papilio Ajax* and *Colias Eurytheme*, the seasonal dimorphism first of *Grapta Interrogationis*, then of others in the same genus, as well as the effects of cold upon larvæ and the perfect insects, may especially be referred to.

There was a marked advance in Vol. II. over Vol. I. in the amount of information given concerning the life-histories of the species described. This is accounted for in the prefatory notice of the present part as follows:

"When Vol. I. was undertaken, in 1868, nothing was known by myself or any one else, of eggs, larvæ, or chrysalids, except of the more common butterflies. As an egg or larva could but rarely be traced back to a particular female, it was impossible that much knowledge could be gained of the life-histories. Scarcely any advance in this respect had been made, in fact, since the time of Abbott, about 1800." . . . But in 1870, I discovered an infallible way to obtain eggs from the female of any species of butterfly, namely, by confining her with the growing food-plant . . . and from that day to the present I have so obtained eggs at will . . . and have reared larvæ without end. In this way, many cases of polymorphism have been established, and the position of many doubtful forms settled. A light has also been thrown on the limits of variation in species. In every case I have preserved descriptions of the several stages . . . Of a large proportion, also, Mrs. Peart has executed colored drawings, magnified when necessary, and my albums contain nearly one thousand figures."

Mr. Edwards concludes: "And so, in this Christmas time of 1886, I commend Vol. III. to the good will of the friends who have made my small audience for so many years."

Surely we may go further—a long way further—than this, and commend it not only to the few friends who have had the good fortune to listen to Mr. Edwards's teaching in the past, and perhaps to catch some of his enthusiasm; but also to every Entomologist or possessor of a library, whether in America or any other part of the world, who wishes to

have the most complete, as far as it goes, accurate, and, for the style of the work, the cheapest—in short, *the best*—work yet published upon the Butterflies of North America. J. FLETCHER.

ON HEMARIS DIFFINIS, BOISD.

BY A. R. GROTE, BREMEN, GERMANY.

In my own collection I labelled a form in which a slight dentation of the terminal band on primaries was perceptible (and which in this respect agreed with Boisduval's figure in the Species General, and with Abbot's of *fuciformis)* as *H. diffinis*. It differed from *tenuis* by a greater breadth of band, a perceptible apical stain, a somewhat brighter or more yellow-haired body. Whether this was Mr. Strecker's *Aettira*, I knew not, since I was unacquainted with this author's work, having seen only his numbers on occasion. *H. tenuis* is more purely a black and yellow species, with no red; it is the smallest and commonest of our Northern forms; the bands narrow, quite even, black; the vitreous spaces seeming larger. Undoubtedly it will be labelled *diffinis*, as, before we wrote, everything was labelled *diffinis* or *thysbe* belonging to this genus. This genus is of the class I have called *progenera*, the species being near allied in all stages. Our forms (although *axillaris* strikingly contrasts with *tenuis)* are near together structurally; they vary in one direction, viz., the gradual increase of the apical red stain, of the width and dentation of the band of primaries, of general bulk. But they are all outgrowths of *fuciformis*, so to speak. They are quite different from *gracilis*. This latter, though very distinct, appears to me to be strictly congeneric with the European *bombyliformis*, rather than with *fuciformis*, to stand alone without near allies, hence I divided it sub-generically to draw attention to its value as compared with the *tenuis* series, among which the Californian forms which I know, *palpalis*, *thetis*, range themselves. Quite American, and therefore certainly to be considered by themselves, are the forms I separated under *Hæmorrhagia*. The mission of Entomologists is to discriminate, not to confound. If our categories are unstable, they may be corrected, but inevitably they must be erected with precision to avoid the popular error of confounding different looking insects under the same category and under the same name.

CORRESPONDENCE.

DANAIS ARCHIPPUS.

Dear Sir,—The butterfly *Danais archippus* is not only harmless, but beneficial. Its food plant *(Asclepias)* is very troublesome to farmers in this part. The butterfly almost always lays her eggs on the pedicel of the flower, so that when the larvae hatch, they attack the flowers and eat down into the ovaries. I have seen an umbel of flowers eaten almost entirely by two larvae. I think they are quite a check to this weed, hindering it from seeding. If they only fed on the leaves, they could not possibly hurt the plant. The mature larva does not feed on the flowers, probably because when it reaches maturity there are not many flowers left.

GEORGE HALEY, Brownfield, Maine.

OPHELETES GLAUCOPTERUS PARASITIC UPON CIMBEX AMERICANA.

Dear Sir,—In the autumn of 1884, I picked up in my garden a larva of *Cimbex Americana*, Leach. This has always been one of my favourite insects, not only for the beauty of the pale yellow larva, with the stripe of deep black down the centre of its back, but also on account of the interest which centres around the emergence of the imago in spring, to see, should it chance to be a female, to which of the three "varieties" it might belong. As the larva in question was apparently full fed, I placed it in a box with some earth and a few of the leaves of its food-plant (*Ulmus Americana*, L.) and in a few days it spun its hard, brown cocoon. The following spring, on looking into the box, I was much pleased to find, instead of the well known, gaudy and clumsy Cimbex, a fine female of the handsome Ichneumon fly, *Opheletes glaucopterus*, Linn., a species not at all common at Ottawa. J. F.

The Canadian Entomologist.

VOL. XIX. LONDON, MAY, 1887. No. 5

ORYSSUS SAYI, WESTWOOD.

BY W. HAGUE HARRINGTON, OTTAWA.

At the Annual Meeting of the Entomological Society of Ontario in October, 1885, I read a brief note on *Oryssus Sayi*, which was afterwards published in the CANADIAN ENTOMOLOGIST (vol. xviii., page 30). It recorded the capture of two ♀ and one ♂ on cedar telegraph poles, and suggested that they might have emerged therefrom. During the early summer of 1886, I added several specimens of Oryssus to my collection, and what is of much more importance, succeeded in gaining a more definite knowledge of the habits of our species. As no account, other than the brief note just cited, has ever appeared in the ENTOMOLOGIST of these handsome and interesting insects, I propose to give a brief paper upon them.

The genus was established by Latreille, according to Westwood (Introduction to the Modern Classification of Insects, vol. ii. app., page 55), and Lucas (Dictionnaire Universel d'Histoire Naturelle, vol. ix., page 230), although Norton, in his Catalogue of the Tenthredinidæ and Uroceridæ of North America (Trans. Am. Ent. Soc., vol. ii., page 350), and Cresson (*idem* vol. viii., page 48) credit it to Fabricius, as does also Provancher (Petite Faune Entomologique du Canada, vol. ii., page 237).

Westwood, in his generic synopsis of British Hymenoptera, *loc. cit.*, gives the following characteristics :—

Oryssus *Latr.*, one British species, type *O. coronatus* Latr.; cylindrical; antennæ ♂ 11-jointed, ♀ 10-jointed; max. palpi long, 5-jointed; ovipositor spiral, capillary.

Norton gives the generic features in more detail as follows :—

"Wings with one marginal and two submarginal cells, the first with two recurrent nervures; lanceolate cell closed; under wings without inner cell. Antennæ inserted at the nasus, 10-jointed in female, 11-jointed in male (Hartig says: ♀ 11-jointed, ♂ 12-jointed); the third and sixth longest, the joint before the last thickened. Head large, rounded, wider than thorax. Mandibles short; labrum entire with two slight lateral im-

pressions; maxillary palpi long, 5-jointed, labial palpi 3-jointed. Ovipositor concealed in a groove beneath, springing from the last segment, long and very slender. It is ordinarily concealed in a channel beneath the abdomen, but is capable of being extended, for which purpose it can be curved at the base. The terebra is formed like that of Urocerus. The anterior lobe of the mesothorax is wide and extended back to the scutellum, while the side lobes are very small. The scutellum is widened and large. Anterior tibiæ with one end spur, simple in the males, dilated and incised in the females. Tarsi 5-jointed in males, 3-jointed in females."

Having now some knowledge of the genus, we can proceed to consider the species. I have not been able to examine a catalogue of European Hymenoptera, but the various authors consulted mention two species. One of these is *O. coronatus* Latr., the type of the genus; the name of the other is not given. Lucas, *loc. cit.*, briefly describes *O. coronatus* as "12 m. long, of a shining black, with the abdomen of a tawny red; the two first segments black, and the last ornamented with a white spot in the males only." This description would apply equally well to a specimen taken by Mr. Fletcher in Vancouver Island, and the figure given might also answer for this specimen. It may, however, have other features sufficient to readily distinguish it from our species. It inhabits chiefly the central part of France and some portions of Germany.

The two European species were for a long time the only representatives of the genus known to Entomologists, and the American species were apparently first brought to their notice by Harris. In his "Catalogue of the Insects of Massachusetts," published in 1833, he enumerated three undescribed species, and in the second edition, 1835, he gave to them the following names: *O. hæmorrhoidalis*, *O. maurus* and *O. affinis;* signifying respectively the red-tailed, the dark-coloured, and the allied. No description of them was published by him until 1841 in his Report on Injurious Insects. In 1838, Newman (Ent. Mag., vol. v., page 486) described the first of these insects under the name of *O. terminalis*, and Westwood (Zool. Jour., vol. v., page 440) described the second in 1835 as *O. Sayi*, having received a specimen from Say. No additional species were recorded until 1879, when Cresson (Trans. Am. Ent. Soc., vol. viii., page 48) described *O. occidentalis* from Colorado and Nevada, and *O. Mexicanus* from Mexico.

All these species have been described from single specimens, or at the most from a very limited number, and the insects have always been rare,

as is evidenced by Norton's statement that he had not seen either *hæmorrhoidalis* or *maurus*.

The first record of a Canadian specimen is by Westwood, who described the ♂ of *Sayi* from one taken in Nova Scotia, the ♀ having been sent by Say from Indiana. Provancher records the occurrence of *hæmorrhoidalis* in the Province of Quebec, a single ♀ having been captured by him.

The first specimen which came under my personal observation was a ♂ captured by Mr. Fletcher in this city in 1883. This insect, through the kindness of Mr. Guignard, is now in my collection under the name *occidentalis*. It was not until 1885 that I succeeded in capturing specimens, as described in the note mentioned at the commencement of this paper. Last year, 1886, I was more successful, and not only found several specimens, but was able to learn something definite as to their habit of life. Between the 9th and 23rd June, I captured more than a dozen, including representatives of all the American species except *Mexicanus*.

After a very careful comparison of these and other specimens with one another, and with the descriptions of the several species, I am convinced that they are all varieties of one species, and that there are at the most only two American species, namely, *O. Mexicanus* Cresson, and *O. Sayi* Westwood, whose name takes precedence over those of Newman and Harris. The latter, indeed, stated that his *affinis* might be identical with *maurus*, as it differed only in having the face entirely black and the feet reddish. Provancher (Additions and Corrections, page 27), after recording the occurrence of *occidentalis* at Ottawa, states that the examination of a number of specimens might possibly prove it to be identical with *hæmorrhoidalis*.

As Harris did not publish descriptions when he named his species, those of Westwood and Newman must replace them, and the species will stand at present :—

1. *Oryssus Sayi*, Westwood—1835 = *hæmorrhoidalis*, Harris.
2. " *terminalis*, Newman—1838 = *maurus*, Harris.
3. " *affinis*, Harris—1841.
4. " *occidentalis*, Cresson—1879.

I have before me twenty specimens which may in accordance with descriptions be distributed as follows :—

No. 1. Two ♀ (one taken by Mr. J. D. Evans at Sudbury), one ♂.

No. 2. Nine ♀, one ♂ (taken by Mr. Fletcher at Victoria, V. I., 24–5–85.)

No. 3. One ♀ (from Rev. Geo. W. Taylor, Victoria, V. I.), three ♂.

No. 4. Two ♀, one ♂.

Although readily separating into these groups, they do not offer any differences of structure sufficient to constitute distinct species. Nos. 1 and 3 have the abdomen entirely black, except that the ♂ of No. 1 has a triangular white spot on apex. No. 2 has four segments black, except the ♂, which has only two, as in the European *coronatus*. No. 4 has only the first segment black, and the ♂ has a white spot on apex.

The antennæ and legs of all have white markings, varying slightly in extent, and Nos. 1 and 4 have short white lines on face. In the specimens from Victoria the smoky band of the anterior wings extends to the tip and also towards the base.

I have vainly sought to find a record of any definite information as to the life history of Oryssus. Regarding the European species, Lucas, *loc. cit.*, says "they are found in our woods, in the spring-time, resting upon old trees exposed to the sun, and often upon those which have been cut; they run very quickly in a straight line, moving also sideways, and even backwards. Fir trees, beeches and oaks are the trees that they prefer." Brullé (Hist. Nat. des Insectes, *Hyménoptères*, vol. iv., p. 638) quotes Dahlbom as placing Oryssus near Cynips, and conjecturing that the larvæ live in galls. Blanchard (Les Métamorposes des Insectes) states that these insects have, "but without doubt wrongly," been attached to the Uroceridæ, and that they are "rare Hymenoptera yet unknown in their transformations; remarkable for the ovipositor of the females, slender and folded under the abdomen. The type, *O. coronatus*, is sometimes met with in the middle of France." Glover (U. S. Ent. Rept., 1877, p. 94,) affirms that "the larvæ bore in the wood of the willow." This is probably an inference on his part from the statement of Harris, that "these singular insects were taken upon a willow tree by my friend the Rev. L. W. Leonard" (Dublin, N. H.) Norton says, "little is known of the larva. Latreille and Klug suppose that they exist upon the wood of standing trees. Scopoli found them upon fir trees, and Latreille upon old house-beams." Provancher merely remarks that the larvæ are supposed to live upon conifers; living trees according to some, and dead ones according to others.

My specimens have, with the exception of the three noted from

telegraph poles, all been taken from old sugar maples, *Acer saccharinum;* the majority of them upon large dead trunks. They were all captured in June upon the following dates: 9th. One male and three females, one of which was under the loosened bark; two others seen. 10th. Two captured and one seen. 11th. Three; one of these was observed just cutting its way through the wood, and its exit was accelerated by the cautious use of a penknife. This was in an old dead trunk, the bark having fallen off and the wood being very dry and hard. It was on this portion of the tree particularly that the insects were observed. 16th. One. 20th. Two. 23rd. One, a female, which was found ovipositing in the place just described, the tip of the abdomen being applied closely to the surface of the wood.

These observations prove that one breeding place of these insects is the wood of old dead sugar maples, and it may be assumed that they also infest the willow, and possibly a variety of trees. Having determined so much, it is hoped that some of our members may succeed in observing the larvæ, and discover whether they are lignivorous or parasitic in their habits. The former probably, but it would not be safe to take it for granted. Insects differing so greatly from other members of the Uroceridæ in structure may perhaps have habits as widely divergent from those of their associates.

For the benefit of those who may wish to make further observations on the habits of these insects, I will briefly describe their appearance: They are stout, black, cylindrical; varying in length from less than two-fifths to nearly three-fifths of an inch. The face is very coarsely punctured, sometimes with a short white line on each side; the vertex prominent, and the lower ocellus surrounded with conspicuous tubercles; eyes moderately large. The antennæ are peculiar: in the male they have eleven joints, the third slightly longer, and four to eleven subequal; in the female they have, however, only ten joints, of which four, five and ten are very short; in both sexes they are touched with white near the middle. The wings are hyaline, with a broad smoky band commencing near the stigma and extending almost to the tips. The legs have a spot on the tip of the femora, and a line on the tibia without, white. In the female the anterior pair are swollen, the tibiæ crooked, and the tarsi with only three joints. The abdomen has the basal segment very coarsely punctured, or scabrous; the remaining ones polished, shining, varying in color as previously mentioned.

The ovipositor is of special interest, as it differs remarkably from those of other Uroceridæ. Usually it is not visible, as when retracted the tip is concealed in a deep cleft in the terminal segments. It has the appearance, as stated by Norton, of springing from the last segment, but it is evidently attached much nearer the base of the abdomen, and is protruded from beneath a small ventral scale which is apparently a portion of the fifth segment. It is very slender, hair-like, and nearly twice as long as the insect, and must consequently be coiled within the abdomen in a manner somewhat similar to that of Ibalia. Norton says it is ordinarily concealed in a channel beneath the abdomen ; Brullé, and other authors, as rolled spirally within it.

The insects are very lively in their motions, running actively to and fro, and always on the alert. They have at such times a marked resemblance to some species of wasps, and might be easily classed as such by casual observers. When disturbed they dart swiftly away, but will generally be found shortly afterwards near the same spot, so that one may frequently, with a little patience, succeed in capturing them, even if they have been missed at the first attempt.

In conclusion I will recapitulate what I have been able to learn of our Canadian species. Its range embraces a vast extent of country, from ocean to ocean, and apparently far northward.

O. Sayi, Westwood.—Ottawa, Sudbury, Nova Scotia.

var. *terminalis*, Newman.—Ottawa, Quebec, Vancouver Island.

var. *affinis*, Harris.—Ottawa, Vancouver Island.

var. *occidentalis*, Cresson.—Ottawa.

Breeds in dead, or old decaying sugar maples, and appears in June.

ADDITIONS TO LIST OF MONTREAL LEPIDOPTERA.

BY G. J. BOWLES, MONTREAL.

During the years 1875, 1876 and 1877, Mr. F. B. Caulfield published in the CANADIAN ENTOMOLOGIST lists of the Lepidoptera occurring at Montreal and vicinity, as far as the end of the Bombycidæ. Since that period the following species have been taken here, and are now added so as to make the list as complete as possible to date. Chateauguay is on the south shore of the St. Lawrence, directly opposite the upper part of the Island of Montreal, and only a few miles distant.

DIURNA.

50. Papilio cresphontes, Cramer. Several examples taken by Mr. J. G. Jack at Chateauguay.
51. Argynnis bellona, Fab. Not common. Taken at Chateauguay and Lachine Flats.
52. Euptoieta claudia, Cram. One specimen by Mr. Jack, Chateauguay.
53. Grapta satyrus, Edw. One specimen, Mr. Pearson, Chateauguay.
54. Thecla acadica, Edw. Very rare, Mr. H. H. Lyman.
55. Amblyscirtes vialis, Edw. Rare, Mr. Lyman.

NOTE.—Of Grapta comma, the forms *dryas* and *Harrisii* have been taken, and of Lycaena pseudargiolus, the forms *violacea* and *neglecta*.

SPHINGIDÆ.

20. Deilephila lineata, Fab. Very rare, Montreal Mountain.
21. Philampelus achemon, Drury. Very rare, larva found feeding on vines in city.
22. Ellema bombycoides, Walker (Harrisii, Clem.) Very rare.

AEGERIADÆ.

3. Trochilium tibiale, Harris. Rare.
4. Albuna torva, Hy. Edw. Rare.

BOMBYCIDÆ.

60. Clemensia albata, Pack. Rare, Montreal Mountain.
61. Parorgyia Clintonii, G. & R.
62. Phobetron pithecium, A. & S.
63. Limacodes fasciola, H. S.
64. Ichthyura inclusa, Hub.
65. Ichthyura albosigma, Fitch.
66. Datana integerrima, G. & R.
67. Gluphisia trilineata, Pack.
68. Notodonta basistriens, Walk.
69. Lophodonta angulosa, A. & S.
70. Oedemasia badia, Pack.
71. Heterocampa biundata, Walk.
72. Heterocampa cinerea, Pack.
73. Heterocampa unicolor, Pack.
74. Prionia bilineata, Pack.
75. Dryopteris rosea, Walk.

All the above species are rare.

76. Prionoxystus querciperda, Fitch. This borer has been taken by Mr. Keutzing in a small grove of oaks at Hochelaga, the only known locality near Montreal.

NOTE.—Of Callimorpha Lecontei, the varieties *confinis* and *contigua* are not uncommon.

FURTHER ADDITIONS TO THE LIST OF CANADIAN MICRO-LEPIDOPTERA.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

Last season being but a poor one for the Lepidopterist in this locality, I got but little that was new to me in this department. Being in communication with Prof. Fernald about the few I had in duplicate, I proposed to send all my single specimens to him, to name what he could and return them to me again. The Professor most generously consented to the very exacting conditions, and returned my insects, which made the double journey by express, without a break, accompanied with the following names :—

34. Botis unimacula, G.–R.
35. Diathrausta octomaculalis, Fernald.
36. Nephopteryx undulatella, Clem.
37. Salebria fusca, Haw.
38. do contatella, Grote.
39. Meroptera pravella, Grote.
40. Ephestia ochrifrontella, Zell.
41. Crambus caliginosellus, Clem.
42. do fuscicostellus, Zell.
43. Propexus pexellus, Kad.
44. Schoenobius Clemensellus, Robs.
45. Teras maculidorsana, Clem.
46. do Logiana, Schiff.
47. do americana, Fern.
48. Loxotænia virescana, Clem.
49. Lophoderus triferana, Walk.
50. Amorbia humerosana, Clem.
51. Œnectra irrorea, Robs.
52. Cenopis reticulatana, Clem.
53. do Groteana, Fern.
54. Dichelia caryæ, Robs.
55. Platynota exasperatana, Zell.
56. do sentana, Clem.
57. Conchylis dorsimaculana, Robs.
58. Eudemis botrana, Schiff.
59. Eccopsis fasciatana, Clem.
60. Proteoteras Moffatiana, Fern. MSS.
61. Phoxopteris semiovana, Zell
62. do dubiana, Clem.
63. do angulifasciana, Zell.
64. Depressaria atroclossella, Clem.
65. do applana, Fab.
66. Semioscopis allenella, Wlsm.

67. Semioscopis inornata, Wlsm.
68. Anesychia texanella, Cham.
69. Choreutis leucobasis, Fern., MSS.
70. Œcophora argenticintella, Clem
71. Gelechia innocuella, Zell.
72. do flavocostella, Clem.
73. do agrimoniella, Clem.
74. Gelechia bicostimaculella, Cham
75. Plutella cruciferarum, Zell.
76. Bucculatrix pomifoliella, Clem.
77. Adelia purpurella, Walk.
78. Dasycera newmanella, Clem.
79. Ypsolophus pometellus, Fitch.
80. Tinea granella, Linn.

There were six names besides these that were new to me, but not to the Canadian list. Twenty-five specimens were returned unnamed. Upon these the Prof. remarks: "Some of the unnamed ones are too poor to name; others are unnamed in my collection, and may or may not be new species; and still others I have not seen before."

I may add here the two following:—

Crocidophora serratissimalis, Zell. Identified by a specimen received from the Rev. Mr. Hulst. Not uncommon here, but resembling others, which makes it liable to be overlooked.

Margarodes quadristigmalis, Guen. Also identified by a sp. from Mr. Hulst; three taken here last summer for the first time. I also saw several of them when in London last October, in the collection made by Mr. Henry Saunders at electric light.

NOTE.—In Mr. Moffat's previous paper (C. E., vol. xix., page 4) the following errors require to be corrected:—

For "5. Arthena" read "Asthena."
"12. H. Harneiata" read "Harveiata."
"16. P. lunigerata" read "cunigerata."

And on page 5, line 18, for "C. lunigerata, var. dispunctaria," read "C. cunigerata, var. disjunctaria."

STRAY NOTES ON MYRMELEONIDÆ.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

1. *Palpares inclemens* Walk., p. 303, No. 4.

This is one of the largest species. Length of body, male 75 m.m.; fem., 60; exp. al., 145–160 m.m. I have before me a couple collected by Dr. Krauss, Stuttgart, on Cap. b. sp., from the collection of the late Dr.

Schneider, Breslau; and two females from Zanzibar, collected by Mr. C. Cooke, Salem, and a female from Zanzibar Island, from Mr. Thorey, Hamburg. It belongs to this species, *P. latipennis*, Gerstaecker, Insects from Zanzibar, 1873, p. 55; a female from the Galla land, 2° latit., which is compared with the male described by myself in Peters' Voyage, p. 99. But this last male is from Loanda (west coast), and not, as stated by Gerstaecker, from Mozambique. Dr. Krauss has collected from 1839 to 1840 on Cap. b. sp. and Natal. Therefore, as far as known to me, the range of this species goes from the Cape along the east coast to the equator. There does not yet exist a description of this species except Walker's, which is correct. I have compared (1857) my specimens with the types of *M. inclemens*, females, so that I have no doubt about the identity. The spots of the wings are sufficiently well described, but there is a character not mentioned which is important. The large transverse band of the hind wing, following the somewhat incomplete basal band, has always in its lower half a large horseshoe-like incision looking with the open side to the base of the wing. This incision is wanting in *P. latipennis* Gerst. The appendages of the male are short, 3 m.m. long, black, with dense black hairs, cylindrical, straight, very little curvated internally and at base; tip rounded, a little inflated, covered with short spines. Below at the base between the appendages is a short, dark, spoon-shaped plate, with a yellow spot on tip.

McLachlan unites *M. sollicitus* Walk. and *M. subducens* Walk., both nearly related to each other, with *M. cephalotes* Klug, as I believe, erroneously. Both are presented by Lord Byron from the Voyage of the Blonde, locality unknown. I have carefully compared the Voyage of the Blonde, because both insects are nearly related to *M. inclemens*, and supposed to be from Africa. The Blonde stopped at Madeira, October 18–23, going then to Rio. On the way home she came from Talcahuana, Coquimbo, to St. Helena Isl., staying there from January 23 to 28. All the time between these dates the Blonde was in the Pacific Ocean. In Madeira certainly these Myrmeleons have never been observed, and from St. Helena Island they have not been mentioned by any collectors since that time. We find it noted that many insects have been observed and collected during the stopping of the Blonde on the Society and Sandwich Islands. If my supposition is erroneous for the locality of the species, I am at least not able to understand how these Myrmeleons could have been brought home by the ships, except by a purchase in other harbors.

2. *Palpares latipennis*, Rbr.

I have never seen the type of Rambur, which McLachlan considers to be a good species. After Rambur's description, I have considered to belong to *P. latipennis*, two males from Angola and a female from the Senegal; one of the males is not now before me. After comparison with the types of Walker, I considered *M. cephalotes* Walk. (not Rambur) to be identical with his *M. furfuracens* (not Rambur's species, which McLachlan, after comparing the type, found new to him), and both were identical with my species. Prof. Peters brought home a male from Loanda a little smaller than the two males from Angola, but perfectly identical; it is now in the Berlin Museum. From those four specimens my detailed description is made in Peters' Reise nach Mossambique, vol. v., p. 99. My manuscript was delivered in 1853, printed in 1854, but published only in 1862. As I have not received any separata, and as the book is rather expensive, my work is very little known. I shall even now consider my species as *P. latipennis* Rbr., until the contrary is shown by evidence.

Length of body, male, 66 m.m.; female, 55 m.m. (not perfect). Exp. alar., male, 118-136 m.m.; female, 144 m m. The appendages of the male, now broken, were 3 m.m. long, and similar to those of *P. inclemens*.

The species, though visibly smaller, is so similar to *P. inclemens* that it was very nearly believed that *P. latipennis* is a western variety, or at least a representative variation of *P. inclemens* from the east coast. The fact will have to be decided by a much larger material than the specimens at my disposition. The differences are (I can not now compare the appendages) the dilatation of the black middle band on the vertex, and the want of a transversal black band below the antennæ; the color of legs is more yellow, but in one specimen nearly brown; the front wings are narrower, less obtuse on tip, the large spots smaller, the apical one rudimentary; the hind wings are narrower, less obtuse on tip, the three basal bands smaller, connected with each other, the first basal band nearly rudimentary, forming only an indication of a narrow horseshoe-like incision; on the hind margin a number of rounded brown spots.

Knowing the variability of large Myrmeleon, of course my opinion of the difference of *P. inclemens* and *latipennis* has to be supported by a larger material; if I am right, and if *P. latipennis* Rbr. is surely different, a new name should be given for my species.

3. *Palpares cephalotes.*

Myrmeleon cephalotes, Klug, Symb. Phyr., i., iv., pl. 35, f. 1, fem.

This species has been misunderstood by all entomologists, and so by Rambur, Walker, McLachlan. As the latter says, "Klug n'en a cependant connu que la femelle," he cannot have seen the description where the forceps of the male is described. Professor Ehrenberg has collected a large number of specimens in Egypt and Dongola, and I have still before me two typical couples, with the name written by Klug still on the pins. Length of body, male, 67 m.m.; female, 58 m.m.; exp. alar., male, 126 m.m.; female, 140 m.m. Pale grayish, a brown dorsal band on the thorax ends narrowed on vertex; facies and mouth pale yellow; antennæ black, the two basal joints yellowish brown; palpi pale reddish brown; last joint of the labials a little incurved, fusiform on tip; mandibles black, shining, long, much more prominent than in the foregoing species; thorax white-villous; mesothorax above on each side with an obsolete stripe; legs ferruginous, femur on tip, tibia on base less dark; tarsi darker, of the female nearly blackish. Abdomen of the male pale, basal half enlarged, covered with a longer dense white villosity; appendages yellow, 6 m.m. long, curvated at the base and inward; space between ovoid; hairy externally; apical half inside with a black brush ending on the somewhat globose tip; each on the extreme base inside with two yellow elongated papillæ, with a black blunt spine as long as the papillæ, articulated to the tip of the papillæ; between and before the two appendages a small conical yellow part. Wings of the males nearly hyaline; smaller, elongated, narrower, tip less obtuse and more pointed than in the foregoing species; front wings with the ante-cubitals brownish at base; a row of small more quadrangular spots around the hind margin at the distance of 2 m.m.; basal part after the 5th vein with more small dots, reaching the hind margin; in the middle of the wings two small oval spots, oblique, about 6 m.m. long, and a more longitudinal one below on tip. Hind wings with few dots on the base of the ante-cubitals; a row of irregular, little larger dots along the hind margin, some of them reaching the margin; the row begins after the basal third of the margin, and ends on the tip; base to the fifth vein without spots; in the middle of the wing five pale brown narrow bands, of irregular shape, not connected, the apical one more or less divided. Wings of the female larger, broader; spots larger and darker, to blackish brown, the two penultimate bands before tip mostly connected; the pterostigma yellow. Abdomen of female brown below, before and around the anus a row of black strong spines.

I have described a larva which belongs very probably to this species.

4. *Palpares Burmeisteri*, Hag.

Myrmecoleon gigas, Burm., ii., p. 998, No. 25.

Palpares cephalotes, Rbr., p. 368, No. 3.

Dalman, Anal., p. 88, describes *M. gigas* only after Drury's figure, as Rambur has done also, but Dalman's description is very incomplete. Apparently the fact was overlooked by Burmeister, and as he had not at hand Drury's figure, he determined *M. gigas* after the insufficient description of Dalman. Burmeister's type from Winthem's collection, a female, is before me. I believe it is *P. cephalotes* Ramb., and therefore Burmeister's species has to be named, until it is proved by evidence that Rambur's *P. cephalotes* is a larger western form of Klug's species. As I have no male before me, I am unable to decide this question. The type is from Senegal. Length of body, 63 m.m.; exp. alar., 150 m.m.

Nearly related to *P. cephalotes* Klug., but larger, the wings broader, with a stronger tinge of pale brown, head broader, 9 m.m. (Klug's species 7 m.m.); vertex much more convex, with a broader black band (only dagger-shaped in Klug's spec.); black bands on thorax larger. Wings more blunt on tip, more spotted near the veins and especially near the hind margin; hind wings in the apical half of the hind margin a regular row of rounded brown spots, distant from the margin, and a row of smaller more irregular spots on the margin itself; this is not the case in Klug's species; of the large brown bands the penultimate is divided, and only the lower part united with the ante-penultimate band.

It would be useless to give more details till more material of both sexes is at hand.

(To be Continued.)

BOOK NOTICES.

THE HESSIAN FLY *(Cecidomyia destructor)* IN GREAT BRITAIN, by Eleanor A. Ormerod, F. R. Met. Soc., Consulting Entomologist of the Royal Agricultural Society of England. Pp. 24, 8vo., London, 1886.

The above is the title of an admirable pamphlet just issued by Miss Ormerod, and adds one more to the many boons for which the agricultural classes in England are indebted to this talented lady. Although all

the information published is contained in 21 of the small pages of a crown octavo pamphlet, so methodical is the arrangement and so concise are the statements, that it may be said to contain all that it is important for the farmer to know of what has been positively ascertained concerning the habits of this destructive insect and the most approved remedies for keeping it in check. With Miss Ormerod's pamphlet he can in a few minutes learn from her excellent illustrations whether an attack upon his crop should be ascribed to the Hessian Fly or not. And if so, he will also find himself provided with advice as to the best steps to take to limit the injury to the smallest possible amount.

Immediately upon the first appearance of the Hessian Fly in England, Miss Ormerod, with characteristic promptness, visited the fields attacked, and at once identified the marauder. That there should be no mistake in the matter, she referred specimens to the highest authorities, and amongst others to our ex-President, Prof. Saunders. All of them agreed with her that it was the true Hessian Fly. She then lost no time in writing to the newspapers and describing how the attack might be recognized. In a few weeks she had examined all the literature on the subject, and had accumulated a vast amount of information as to the extent of the injury committed; so that before the winter set in she was able to give the farmers good practical advice as to the best means of stamping out the new enemy. This she has now consolidated into the useful report under consideration. We have, first, a short historical sketch of the fly as an injurious insect; then an estimate of the injury caused during the past season in England and Scotland, which was considerable. In one English and three Scotch localities the loss was calculated to be several bushels to the acre. The appearance of the attacked crops is described in a plain, intelligible manner, together with the insect in its different stages, from the egg to the perfect fly, and an abstract is given of its life-history. The important question, "Where does the Hessian Fly come from?" is then discussed. This treats of the different means by which the insect may be introduced, and it is shown that it may come in the "flax-seed" state amongst seed-grain, or in straw which having come from infested countries either as straw-cargoes, or as packing, is used for horses and cows in London, and then sent out to farms in the country as slightly used litter, or as "long manure." When this is the case, says Miss Ormerod, "a sufficiently large proportion of the flies in the flax-seed state are likely to develop to cause mischief such as we have seen in the past season. On

the first farm on which the attack was observed near Hertford, I found on enquiry that London manure had been used of mixed kind, but mainly cow and horse manure in very 'long' condition."

An observation of the greatest importance was made by Mr. Palmer, of Revell's Hall, near Hertford, viz., that the "flax-seeds" are separated from the straw in threshing. This was previously thought not to be the case. As, however, they are thus loosened from the straw, they are, of course, liable to be mixed with grain, and with it transmitted from place to place; but in Mr. Palmer's case they were not found amongst the grain, nor in the chaff, but in the dust and rubbish which falls beneath the threshing-machine. In a handful of siftings he found no less than fifteen "flax-seeds." This rubbish is comparatively worthless, and if English farmers are careful always to burn it upon a waste spot, it will certainly reduce the number of the parent flies from which another serious attack may originate. It is the custom amongst our best Canadian farmers to do this in districts where the Wheat Midge ("Weevil") is prevalent, and is attended with very satisfactory results.

Our authoress continues: "From the above observations it appears that puparia, or 'flax-seeds' *may* be transmitted in corn rubbish. In samples of screenings and sweepings from imported corn, I have found, besides a large amount of live and dead beetles, also weed-seeds, smut and other matters undesirable to spread abroad (as may easily be done where these are used for poultry-food, and thus thrown out in farm-yards), and as, with these, broken bits of stem are to be found, it appears at least possible that 'flax-seed' may also be conveyed. In Dr. Packard's paper on the subject, he alludes to the possibility of the pest being transmitted in wheat."

The best methods of prevention are treated of at some length, and their applicability to the farming processes in vogue in England are reviewed. The favourite preventive remedy—late sowing—is shown to be applied in England as an ordinary part of the regular arrangements of the work on most farms; as a rule wheat is not sown until some time after the 20th of September, the date which we consider the latest it is necessary to wait to avoid attack, and thus the young wheat plants are not up till after the autumn brood of the fly is dead. The importance of this point cannot be laid too much stress upon, for if late sowing be regularly practised, the Hessian Fly must be dependent for its subsistence upon self-sown plants in fields which had been attacked, or upon rye or other

grain sown as sheep-feed. This reduces to narrow limits the lines in which experiments may be successfully tried to prevent this enemy to England's staple crop from establishing itself and getting beyond the control of the farmers.

Perhaps the most satisfactory feature about this outbreak of the Hessian Fly in England is the fact that it has appeared in so many places, and has thus been brought forcibly before the attention of farmers in all parts of the kingdom, and they, being aroused, will now see the necessity of promptly carrying out the instructions necessary for its extermination.

The Royal Agricultural Society through Miss Ormerod, and the Government through Mr. Whitehead, have done everything in their power to apprise the farmers of their danger, and have put in their hands as weapons with which they may confidently hope to cope successfully with their new enemy, concise information as to its life-history and habits which will enable them to recognise it at once, and apply without delay the proper treatment. Briefly, this consists of (a) late sowing of the main crop, so that there is no accommodation ready for the autumn brood, by which a large proportion will necessarily perish without egg-laying; (b) feeding off or ploughing in any early-sown or volunteer crops which may be found to be infested, so that the eggs and maggots may be destroyed; and (c) deep ploughing, by which loose puparia or infested stubble may be buried too deep in the ground to allow the perfect flies to emerge.

From the historical sketch which is given of the occurrence of *C. destructor*, it would appear that although a watch has been kept upon it since its first outburst as a destructive scourge in North America in the year 1786, it had never been actually identified as occurring in Great Britain until July, 1886. The large number of widely separated localities, however, from which its ravages have now been reported, might lead one to the conclusion, either that it must have been established for some time previous to that date, and that it was only Miss Ormerod's energy and zeal which then brought its operations to light; or that some special circumstance has taken place during the past summer by which it has been distributed over the whole kingdom; or again, that some special climatic condition has allowed it to exist where it had failed to do so before. For several years Miss Ormerod has had an active and observant body of intelligent workers in all quarters of Great Britain, and it is strange, if it existed at all, that nothing has been heard previously of its operations. Nevertheless, on the other hand, from the large quantities of straw and

seed grain imported annually into the British Isles from countries known to be infested by this fly, together with the present rapid and easy methods of transport, it is at least extremely probable that it has been introduced over and over again, and it is difficult to understand why it has not long before now secured a firm foothold there. May it not be hoped that the law which applies with regard to many noxious weeds, will also be found to hold good in the case of this injurious insect? The existence of any plant as an aggressive weed in a given locality appears to be not so much a question of the introduction of the seed, as of the plant finding there the conditions suitable to its growth and healthy reproduction. There are many plants, for instance, troublesome weeds here, which must have been frequently introduced into Europe from this continent (or in some instances taken back again to the place whence we originally received them), but which have never yet taken forcible possession of cultivated ground, e. g., the common Purslane *(Portulaca oleracea)*, Hound's Tongue or Burrs *(Cynoglossum officinale)*, Small Burrs *(Echinospermum Lappula)*, and the common Foxtail grasses *(Setaria glauca* and *viridis)*; and then, although relatively they are far fewer, there are some which must have been frequently introduced on this continent, but which, except in a few localities, cannot (or do not) exist for more than two or three seasons, e.g., the common Scarlet Corn Poppy *(Papaver Rhœas)*, Scarlet Pimpernel *(Anagallis arvensis)*, common Groundsel *(Senecio vulgaris)*, Corn Gromwell *(Lithospermum arvense)*, and the common Nettles *(Urtica dioica* and *urens)*. In the same way there is no doubt whatever that the Colorado Potato Beetle *(Doryphora 10-lineata)* has been many times conveyed to the British Isles on transatlantic steamships, but not finding there conditions suitable to its requirements, it has failed to establish itself.

Miss Ormerod, quoting from Bulletin 4, U. S. Ent. Commission, tells us that "the original habitat of the Hessian Fly is considered most probably to have been Southern Europe and Western Asia, i. e., about the shores of the Mediterranean Sea," a district with a summer climate of far greater heat and aridity than is found in the British Isles. Again, in North America, where—whether introduced or indigenous matters not in this connection—this pest to our sorrow flourishes to a most remarkable degree, it has always dry, hot weather during the periods in which it passes through its active stages.

In view of the above facts, and notwithstanding that it has occurred in considerable numbers in many parts of Great Britain during the past

summer, I think it probable that its wide-spread appearance as an injurious insect was due either to some special cause which had not existed before, or to some unusual climatic condition, rather than to its having established itself in a new habitat suitable to its reproduction and increase. Furthermore, if the farmers can only be frightened sufficiently to induce them to obtain the pamphlet under consideration and to follow closely the advice which is there offered them, I cannot help thinking that before very long Miss Ormerod will be able to relegate the Hessian Fly to a place amongst the foes she has conquered.

JAMES FLETCHER, President Entom. Soc. of Ontario.

NORTH AMERICAN LEPIDOPTERA: THE HAWK MOTHS OF NORTH AMERICA, by A. Radcliffe Grote, A. M. Printed by Homeyer and Meyer, Bremen, 1886.

The above is the title of an interesting brochure by our old friend Prof. Grote, who has done so much to advance our knowledge of the North American moths. The press work is superb. For clearness of print, nice paper, and excellent taste in the selection of contrasting type for the heading of the sections, this work is a model.

After a graceful dedication to Prof. William Saunders, former editor of this journal, our author gives directions for collecting and preserving insects, followed by a chapter on the relation and habits of the *Sphingidæ*. He then takes up their classification, beginning with the sub-family *Macroglossinæ*, under which he includes the genera *Hemaris*, *Lepisesia*, *Thyreus*, *Enyo* and *Deidamia*. Then follow the sub-family *Chœrocampinæ*, including the genera *Everyx*, *Ampelophaga*, *Deilonche*, *Deilephila* and *Philampelus;* the sub-family *Smerinthinæ*, including the genera *Calasymbolus*, *Paonias*, *Cressonia* and *Triptogon;* and the sub-family *Sphinginæ*, including *Ceratomia*, *Daremma*, *Diludia*, *Dolba*, *Phlegethontius*, *Atreus*, *Ellema*, *Sphinx* and *Dilophonota*.

The reason for establishing the new genus *Deilonche* for *tersa*, is not very clear to me, nor do I feel so sure of the wisdom of establishing the new genus *Atreus* for the reception of *plebeius*. The fact is, that while studying the *Sphingidæ* of New England, I found more genera than I well knew what to do with, and perhaps I am on that account less disposed to look with favor on new genera. Our author says, "the type *(plebeius)* is, I think, not congeneric with the European *pinastri* (the

type of *Hyloicus)* nor can I find an Hubnerian genus for its reception. I should leave it in *Phlegethontius*, as Fernald seems to suggest, but it differs in the 12-veined primaries, etc." It is, perhaps, proper for me to say that in my studies of the venation of the *Sphingidæ*, I found that the species of this family, so far as I had material to study, had either eleven or twelve veins in the fore wings according to whether vein 10 was present or wanting. This vein arises from 9, near its outer end, and lies so close to it as to be easily overlooked. After denuding a long series, including many individuals of some of the species, I found that while the other veins were constant as to origin and termination, vein 10 is very variable and not to be relied upon, for in some examples it was present in one wing but absent in the other. It seems to differ as to the point of origin, sometimes arising from vein 9 at some distance from the border of the wing, at other times nearer the border, again close to the border, and again it was entirely wanting either in one wing or both; all in the same species. In my essay on the *Sphingidæ*, I stated that it was very doubtful if this vein would prove of any assistance in classification. I still hold to the opinion that this species will finally gravitate into the same genus as *celeus*. Finally the generic name *Atreus* is pre-occupied, having been used by Hoch in 1837 for a genus of Scorpions, and therefore cannot be used in this connection.

Cerisii is placed by itself in the subgenus *Copismerinthus*, and *geminatus* under the subgenus *Eusmerinthus*, with the variety *tripartitus* Gr., given for those individuals which have *three* blue spots on the black anal patch on the hind wing.

Prof. Grote divides the time of the work on our lepidoptera into three periods : The first including that of Abbot, Boisduval, the elder LeConte, Say, Peck, Harris, Gosse, Kirtland, and their historian, Dr. J. G. Morris. The second period, the one which he calls the "Renascence," is the period in which the American Lepidopterists catalogue the different families of the lepidoptera and thus lay the foundation for present and future discoveries. This period, which came to an end with the appearance of Grote's New Check List, "was a time during which a great deal of work was performed with good humor and at considerable self-sacrifice," and no one did his share of this work, which was more or less drudgery, more cheerfully than did Mr. Grote himself.

The author says that the writings of our entomologists have a flavoring of the localities from which they emanate, thus, "in some way the

scent of the Maine woods has got into Prof. Fernald's writings," and we may say in return that a vein of poetry runs all through this charming little work which we are now reviewing.

C. H. FERNALD, Amherst, Mass.

CORRESPONDENCE.

THE GENUS QUADRINA.

Dear Sir,—Mr. Grote, in the current vol. of the CAN. ENT., p. 40, takes exception to my note on this genus, and says my "remarks as to *Hemileuca* are uncalled for." The only thing I said in the note commented on by Mr. Grote, in regard to *Hemileuca*, was: "In Mr. Grote's Catalogue of 1882, *Quadrina diazoma* is placed in the '*Hemileucini*' and is associated with *Hemileuca*, *Hyperchiria* and *Coloradia*, which are all typical *Bombycids*." This is the fact, as a simple reference to the list will prove, and I cannot see in what manner the remark was uncalled for. I knew of all that Mr. Grote had written on the subject, and simply assumed, as I had a right to do, that Mr. Grote had changed his views as to the position of the genus, and that his latest view was expressed in the list. That the location was due to a printer's error I could not know. However, its position in the *Ceratocampidæ* is equally unnatural. As that group stands in Mr. Grote's list it is a perfectly natural and sharply limited one, all the members of which have in the male two branches to each side of each joint of the antennæ, which are moderately long, and the pectinations do not extend to the tip. In *Quadrina*, on the contrary, the joints are extremely short, the pectinations extend to the tip, and are very long; there is only a single branch to each side of each joint. If the specimen is a female, as Mr. Grote says, the antennal structure is unique and out of harmony with that of the other *Ceratocampidæ*. It would break up the group entirely to admit such a form in it. But I believe the specimen to be a male. I do not find in my notes on the species any mention of the sex, but my recollection is that it was a male. The species belongs most nearly where Mr. Grote first put it. I quote my own remark—"nearly related to *Gloveria*."

As to the *Hemileucini*, I have taken from it the genera *Hyperchiria* and *Coloradia* and placed them in the *Saturniidæ*, in a recent revision of that Group in the Proc. Nat. Mus., ix., pp. 414–437.

JOHN B. SMITH, Washington, D. C.

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THE EARLIEST BUTTERFLIES AT THE WHITE MOUNTAINS OF NEW HAMPSHIRE.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

A few years ago a visit was made to the Glen, in the White Mts. of New Hampshire, in the early spring, just as the first tender leafage was appearing (June 2–5), and a report of the thirteen butterflies then found was published in *Psyche*, 1874, vol. 1, p. 13–14, 18–19. Wishing to secure eggs from some of the wintering butterflies abundant in that place, which I then failed to secure from being too early, another visit was made last spring to the same place, and at the same date (June 3–7), as the season was evidently sufficiently advanced to make it practically at least a week later; and so it proved, the vegetation at the Half-way House, at the upper limit of forest growth on the Mt. Washington carriage road, being this spring exactly at the stage at which I found it in the valleys at the previous visit, the difference in elevation being over fifteen hundred feet. The sky was equally sunny in both cases.

The collecting ground was the same as previously, excepting that on this occasion there was superadded an ascent of Mt. Washington by Tuckerman's Ravine, with a descent by the carriage road; and also a walk southwardly from the Glen to North Conway.

This last walk showed a very distinct change in the fauna from the considerable clearing at the Glen to the open country to the south (a thousand feet lower), after the eight miles of unbroken forest, ending at Emery's, was passed. *Pamphila sassacus* at once appeared in considerable numbers; *Brenthis myrina*, *Phyciodes tharos* and *Atrytone hobomok* were far more common—all indicating an earlier appearance at this altitude, since they are common enough at the Glen in their season; while only two or three *Cyaniris pseudargiolus* were seen, in place of the abundance farther north, and not a single *Amblyscirtes samoset*, which had been seen sparingly at the Glen for several days.

The most interesting observation on the trip, however, was that of three individuals of *Oeneis semidea* on the mountain summit. There is indeed a possibility of error here, for no one of them was taken, though two were near enough to warrant a dash with the net. They appeared to be unusually dark, but they had every other appearance of this butterfly, including size and their manner of flight, when flying tolerably high on a not windy day. As the caterpillars have been taken fully grown and wandering in September, it is altogether probable that they pass the winter (as has always been supposed) in chrysalis; and if so, there seems to be no reason why they may not emerge as early as this; but as the butterfly has never before been found on the wing earlier than July,* and is never known to be abundant before the second week in that month, and disappears by the middle of August, it would seem not impossible and even probable that the butterfly is double-brooded, at least in part. This certainly seems strange at such an inclement altitude, especially as the European *Oeneis aello* (which winters, at least sometimes, like many other Satyrids, as a juvenile caterpillar) is believed to take two years to reach maturity.

The only other butterflies seen above the timber were *Eurymus philodice*, twice near the summit and once in Tuckerman's Ravine; and *Lycaena americana*, seen once a mile or two down from the summit. A single *Cyaniris pseudargiolus lucia* was seen near the edge of the forest just before entering Tuckerman's Ravine.

It may be added that the snow patches about the summit of Mt. Washington, which were not very extensive—their size, as seen from the valley, diminishing perceptibly in the few days of our visit—were peppered with minute insects, largely made up of a few species; the most abundant were an Aphis, two or three flies no larger than Aphides, some other minute Homoptera, one or two minute Hymenoptera and equally small Coleoptera. Among larger forms were a species of the heteropterous genus *Acanthosoma*, according to Mr. Uhler, probably *A. nebulosa*, which was the most common of all, and *Bibio femoratus* Wied. (determined by Dr. Williston); every pool of melted snow contained three or four of the latter, while the former fairly swarmed everywhere.

As to the valley butterflies, the advanced season was as apparent with

* Harris, however, on the authority of Oakes, gives June as one of the months of its flight.

them as with the vegetation, as will be seen by the following serial notes, as well as by the much longer list. Twenty species in all were seen, fourteen of them not seen on the previous visit, while, more remarkable than that, seven of the thirteen species before seen were not now observed.

Basilarchia arthemis, found previously in abundance as a larva just out of hibernaculum, and *B. disippe*, sparingly in the same condition, were not discovered at all. Hundreds or perhaps thousands of the shoots of black birch were examined, as well as many poplars and willows in suitable spots, without a trace of anything—not even of a leaf eaten in Basilarchian fashion.

A single specimen of *Polygonia interrogationis umbrosa* was seen on the 7th, on the Notch road south of Emery's.

Polygonia faunus was taken or seen every day but the 3rd, on forest roads; perhaps two or three dozen in all were taken, and about a third of them were females. None were seen beyond Emery's, and none in walking from Gorham to the Glen, the latter on a somewhat cloudy afternoon.

P. gracilis was not met with. One butterfly was seen two miles up the Mt. Washington carriage road, which looked very like *P. comma*, but was perhaps *P. faunus*. None of the females would lay eggs on young willows, in their two or three days confinement in the Glen, nor on larger plants in Cambridge after my return home.

Polygonia progne and *Nymphalis j-album* were not seen this year.

Two specimens of *Papilio antiopa* were seen, on the 4th and on the 7th.

No *Aglais milberti* was observed on this occasion.

Two fresh specimens of *Argynnis atlantis* were seen on the 7th, one in the forest a short distance north of Emery's, the other half way from there to Jackson.

Fresh specimens of *Brenthis myrina* were seen every day after the first (and either this or the next species on that day), and all taken were males. The number increased from two on the 4th to three or four times that number on the 7th, before reaching Emery's, and after that as many more, though it was then after 3 o'clock.

Unless the specimen seen the first day was *Brenthis bellona*, this species was only seen on the 5th, in a few examples, in which both sexes were represented, and all were more or less worn.

Phyciodes batesii was seen on the 7th, and of each sex, three or

four on the forest road south of the Glen, and abundantly beyond Emery's.

The larvæ of *Cinclidia harrisii* were found feeding on *Diplopappus*, in the penultimate and final stages, in a dozen different localities in the Glen. They were apparently just about as forward as they were on the previous visit, only then they were found at Gorham, which, though farther to the north, is 800 feet lower than the Glen, and in a broader, more open valley, where the spring opens slightly earlier than at the Glen. The caterpillars taken this year went into chrysalis between June 7 and 13, and emerged June 21–27.

Though half a hundred plants of *Loricera* by the roadside were searched for *Euphydryas phaeton*, this species was not found as on the previous occasion, nor did any of the plants appear to have been eaten.

During the first half of our stay, *Cyaniris pseudargiolus lucia* was the most abundant butterfly, and though afterwards it did not diminish, it was supplanted by the increasing numbers of the next species. Yet when most abundant its numbers by no means equalled those at my former visit, and at no time were more than five or six seen at once. On the last day, south of Emery's only a couple of specimens were seen, so that the first brood was disappearing; all were of the form *lucia* or heavily marked *violacea*. Females were enclosed over *Amelanchier*, *Vaccinium* and *Cornus*, and laid abundantly on the first two, but not on the last. When the larvæ emerged, however, they would not touch either *Amelanchier* or *Vaccinium*.

In the last half of our visit *Lycaena americana* was the commonest butterfly. It was the first seen in the morning, the last in the afternoon, and appeared everywhere excepting in Tuckerman's Ravine and above timber on Mt. Washington, though seen once on the latter. Not a specimen was seen on my previous visit.

Three specimens of *Feniseca tarquinius* were taken, and others were seen; one of the two females taken, old and battered, was left three days enclosed over a branch of *Alnus*, on which were numerous young and fat *Coccidæ* (none with Aphides were discoverable), but no eggs were laid; the other taken the last day, died on the way home, with numerous eggs in her abdomen.

Eurymus philodice was tolerably common every day, and increasingly so. On my previous spring visit none were seen. Two specimens were seen in the alpine zone of Mt. Washington, and one in Tuckerman's

Ravine—the only butterfly seen there; both had probably flown in from below.

A few fresh specimens of *Pieris rapæ* were seen every day but the first; most on the last day, below Emery's.

Six or eight specimens of *P. oleracea* were seen, all very fresh; of the three or four taken only one was a female.

Though *Euphœades turnus* was seen every day in very fresh condition, it was not yet abundant; four, however, were seen at one roadside puddle, and all were exceedingly tame.

Several fresh specimens of *Thanaos icelus* were seen the first day and the numbers increased daily, both sexes fresh, but the female predominating. Several females were enclosed on different species of poplar and willow, but laid no eggs.

Two male specimens of *Cyclopides mandan* were taken by the roadside on the 5th, and one or two were seen north of Emery's on the 7th.

Males and females of *Amblyscirtes vialis* were seen every day, but never more than three or four specimens a day. Enclosed females laid eggs on grass on June 5–6, which began to hatch on June 14; the first one to change stopped eating on July 18 or 19, and in about ten days changed to chrysalis. The species has never before been reported from this region.

A couple of specimens of *Amblyscirtes samoset* were seen, and one of them taken on the 7th, north of Emery's.

The first *Atrytone hobomok* was seen on the 7th, in the Glen, another between that and Emery's; but south of that at least a dozen specimens, all of them males.

Pamphila sassacus first appeared at Emery's, south of which it was twice as abundant as the last species; a couple of females were taken, but nearly all the others seen were males. It was evidently going to be very abundant.

SYNONYMY IN AMERICAN COLEOPTEROLOGY.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

On looking over Melsheimer's, Crotch's and Henshaw's Catalogues of the described species of North American Coleoptera, many names will be seen placed as synonymical, or varietal; while a reference to the bibliography of the many synopses and monographs of families and gen-

era in the Trans. Am. Ent. Soc., and other publications, exhibits a number still larger. How were so many originated? and, Have they any value? are questions that it may not be unprofitable to briefly consider. As to their origin, it may be asked: Are they descriptions of the same forms made by different writers in ignorance of what had previously been done? or, of forms that at the time were regarded as distinct, but afterwards, by connecting links, seen to be but variations within specific limits? or, from mistaken identification and other causes? The history of American Coleopterology shows all these to have been factors in varying quantities. Before the year 1824, no description of any species (so far as known) had been published on this side of the Atlantic; but, for more than one hundred years previously, large numbers had from time to time been taken over and described in every country of Europe, many of them several times by as many names. The works of these various describers were mostly unknown or inaccessible to American students of that period, so that when Mr. Thomas Say, the founder of this branch of Entomology here, undertook the description of our species at the year mentioned, it was often impossible for him to know what had been done abroad. Haldeman, Melsheimer and others thus continued the work till 1844, they and the Europeans making synonyms reciprocally, in ignorance of what each had done. About this time appeared a talented, scholarly, enthusiastic young man, who, on seeing so many of "our finest insects going to Europe for names," with Juvenal exclaimed, "*Siccum jecur ardeat ira*," and forthwith the immortal Leconte devoted his life (as he informs us) "to the classification and naming of American Coleoptera, even at the risk of creating much synonymy." How well he did his work needs not to be told to the Coleopterological world of either hemisphere. The synonymy made proves to be much below what might have been reasonably anticipated. Mr. S. Henshaw in his Index gives, to that time, the number of species named by Dr. Leconte as 4,734, to which is to be added 80 published posthumously—in all, 4,814. Of these only 864 were considered synonyms, and 188 as races or varieties. This kind of synonymy may be termed re-descriptive, and with proper care and a judicious restraint on haste, but little of it should be made with us hereafter.

A second source of synonymy arose from the descriptions of certain forms as distinct, that differed so much from the assumed type—perhaps in size, ornamentation, or even structure—as to seem different, but subse-

quently discovered to be merely variations of one thing; just as one ignorant of the variations of *Canis familiaris* might describe a poodle, a Newfoundland, a bull-dog, etc., etc., as true species of *Canis*. In the early times of description this was unavoidable, as the extremes of many of the variable species look so unlike that it could not be known they were the same till it was proved by more extensive collections and after discoveries. In his lifetime Dr. Leconte eliminated many of the ones made by himself and others, and Dr. Horn, in his studies, with enlarged collections and more abundant opportunities, adds to this, and in suppressing species sometimes carries the matter too far to please collectors, but doubtless no further than is warranted by well ascertained specific variation.

There is another source of synonymy that practically does not differ from the last, except in this, that it is made intentionally by writers who are a little mixed, or have a different conception of what constitutes a species from that entertained by our leading Entomologists, and the authors of our lists of Coleoptera.

And here it becomes necessary to say something about species. No definition of this term as applied to organisms has ever been received as entirely satisfactory, and a discussion of it here is foreign to the object of this paper. For practical purposes it was necessary for naturalists to have a definition of universal applicability, and that of Buffon has generally been accepted by most of the leading Zoologists and Botanists since his time, namely: "A species is a constant succession of individuals similar to and capable of reproducing each other." The believer in special creation, the evolutionist, and such as hold opinions between these extremes, can meet here on common ground. Coleopterists on this side of the Atlantic mostly agree with it in substance, giving it expression in this form: "A species is an aggregation of variable individuals which have a common parentage." With this definition, except in case of uniques, obviously it would be unscientific to make any individual a type. This is the line to which systematists are endeavoring to bring our species, and the further it is pursued, we find typical superseded by normal descriptions which embrace the points of agreement of as many individuals as can be examined, and reject the points of disagreement, as individual or racial.

The synonymy thus made has not been very extensive, but threatens to become so through the writings of Mr. Thos. L. Casey, who, for the

short time since the issue of his first paper, proves to be a very industrious and prolific author. He does not seem to have accepted the above definition, or at least to a great extent ignores it in practice, but the idea he attaches to the term species is only known by inference. He writes, Bul. No. 6, Calif. Acad. Sci., p. 162: "Forms which some Coleopterists would regard as specific, are held by others to be simply racial, and by others again as merely accidental variations not even worthy of a name." That he entertains the first of these opinions seems to be a correct inference, from the fact he has described as valid among the larger species a considerable number of forms which others consider as variations. Now, it can scarcely be supposed that he did not know, in common with others, the common parentage of many of these; and, if so, then he does not fully recognize this relation as essential in the construction of species. In other words, he founds his species on identity of structure, thus making them practically artificial, like genera. This brings him into direct conflict with those who regard common parentage as an essential element in species, and as they happen to be in the majority and control our catalogues, many of his species are placed in synonymy at once. Mr. Casey, among our Coleopterists, seems to stand alone in his views, but Lepidopterists for a long time appear to have had a somewhat similar split.

These two views are diametrically opposite. The first recognizes no single individual as a type when others are at hand, and raises an insuperable barrier to the multiplication of species. The second describes more or less minutely any individual, and calls it the type of a species, but never defines how far it is allowable for other individuals to vary and still belong to that particular species, and so can offer no defense against their multiplication *ad libitum*.

The re-description by Americans of our Coleoptera that were first described in Europe, has been and still is of inestimable value, and it would have been no loss had every species of ours described there been re-described here and placed in synonymy.

The original descriptions were often largely defective and so indefinite that to make a determination with certainty was impossible, even when they were accessible. The American descriptions in the synonymy are much clearer, and from them, with a little practice, except in minute or closely related species, the insect may be readily known; and in fact, for many species are the only accessible or intelligible descriptions we yet have. As no two writers present the same thing in the same way, by

synonymy many doubts may be solved that could not be by a single description.

The second kind of synonymy, which may be regarded to a certain extent as embracing the third, is likewise more or less useful, when fully established. The names represent, within specific limits, variations more or less divergent. These differences may be of a trivial character—of the kind Dr. Leconte excuses himself for making in early life, on the ground that, like most young Entomologists, he had magnified characters as of importance that were merely individual or of no importance; still a reference to even such may give points of information not likely to be so lucidly set forth in the normal description of the species. Or, again, these names may represent the extremes, or even the sexes of a variable species that in ignorance of their true relationship have been described as true species. This is the most valuable part of synonymy, because when a species is treated as a whole, the peculiarities of individuals and races are usually less clearly stated than when specialized.

A catalogue of our described Coleoptera with the established synonymy would be exceedingly valuable to all our students of Coleoptera. It is a desideratum.

It was intended to have closed this paper here, but the occurrence of *Carpophilus hemipterus* Linn., affords an opportunity to present a practical illustration in reference to some of the foregoing statements. This species is potentially cosmopolite, having been carried to many countries by commerce, and in Europe has many synonyms. The present colony, consisting of several hundred individuals, was found in a box of raisins recently from Spain. It is a good example of the great variableness in structure and coloration that may occur among the individuals of a species, as is well pointed out by Mr. A. Murray, in his Monograph, p, 363: "For example," he says, "the following variations occur in the form. with intermediate degrees of each, viz:

"1.—The posterior angles of the thorax nearly right angles.

"2.—The posterior angles of the thorax nearly rounded.

"3.—The posterior angles of the thorax nearly cut off.

"In color, again, it varies as much, the variation, however, being referable to greater or less intensity of coloring." I was able to verify Mr. Murray's statements in every particular from this single colony. This is a good demonstration of the impropriety of making any individual the type of a species, as well as of disregarding common parentage as an essential element in the construction of species.

STRAY NOTES ON MYRMELEONIDÆ.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

(Continued from page 93.)

5. *Palpares papilionoides* Klug.

I have never seen this species, except the couple from Arabia Felix in the Berlin Museum, described by Klug, Symb. Phys., iv., pl. 35, f. 2 and 3. Rambur, p. 369, No. 5, described the species after Klug's figures. Rambur and others, not excepting myself, believed that the male did not belong to the same species as the female. Klug calls it a variety. After a thorough study of the species in Berlin, I arrived at the conclusion that Klug was right, and *P. cephalotes* Klug shows a similar but not so exaggerated difference between both sexes. I have carefully compared the types with the figures, and found them to be very exact. Indeed, Mr. Weber was one of the best draughtsmen in Germany. *P. papilionoides* had nothing whatsoever to do with *P. aeschnoides*, as McLachlan supposes. The types of both species are in the Berlin Museum.

6. *Palpares immensus*, McLachl.

The species is described, 1867, Journ. Linn. Soc., ix., p. 239. I have to state that the excellent description leaves no doubt that my *P. comes* noted without description, 1866, p. 456, is the same species. My specimen is a female from the Nagami Lake, presented by Prof. Boheman. Length of body 66 m.m.; exp. alar. 160 m.m.

I am glad that my manuscript name is explained; at the same time I ask to cancel also *P. conspersus* Hag., l. c. p. 456, from Nagami Lake, by Boheman, as the type has been destroyed; there will be specimens in the Stockholm Museum.

7. *Palpares Caffer*, Burm.

This species is mentioned, Burm., ii., p. 998, No. 23, with *P. speciosus* L., as follows: "A very similar but larger species, with the gray spots of the front wings very small, from south-east Africa, was received from the collection of Mr. Drége. I name it *M. Caffer*. The abdomen of both sexes shows the same difference (as *M. speciosus*)." I have before me two females, one from Dr. Schneider's coll., the other coll. by Dr. Wahlberg in Caffraria, from the Stockholm Museum. The British Museum has four

specimens among Walker's types of *M. speciosus.* Finally I have seen the types of Burmeister in the Halle Museum. The species is mentioned by McLachlan in his review of Walker's paper; as far as I know, it has never been described. Fem., length of body, 50 m. m.; exp. al. 120 to 130 m.m. As I have no males before me, I give briefly the characters to recognise the females: The front margin of prothorax notched in middle; with two transversal rolls, one before the front margin, the other before the hind margin; between them a flat, narrow, deepened saddle, perhaps eight times broader than long; a longitudinal black median band is only a little enlarged on the saddle. *P. speciosus* has the front margin straight; the black median band fills the saddle on each side nearly to the side margin; the band is on the front roll triangularly dilated, but is wanting on the hind roll. This character is very good to separate directly both species. *P. Caffer* has the wings broader, more obtuse on tip, less spotted; front wings saffrony, with smaller ashy gray spots; there are much less numerous little spots around hind margin, and nearly none on the disk; ante-cubitals with black linear bands; pterostigma straw color; hind wings paler, about hyaline, the brown bands less large, not connected, the penultimate sometimes divided; abdomen brown, darker below.

The description of the appendages of the male is needed.

I have two females from Pniel Station, Damaraland, which I had named *P. sparsus.* As this name is now pre-occupied by a similar, perhaps the same species, from Damara, by McLachlan, I refrain from giving a description. It is intermediate between *P. speciosus* and *P. Caffer*, but the black band of the prothorax is as on *P. Caffer.*

8. *Palpares pardalinus* Burm.

Burmeister, Vol. ii., p. 997, No. 20, describes the male from Orange River, South Africa, collected by Drége. In 1849 I bought the second specimen from Drége's collection, also a male, which I have compared with Burmeister's type still present in the Halle Museum. *Myrmeleon pardalinus* Walk., p. 314, No. 26, a female from the Cape, is the same species. This was doubted by McLachlan, Journ. Linn. Soc., p. 275, and for the species the name *P. brachypterus* proposed. Rambur's species is different. In 1850, in Peters' Voyage, p. 101, I had placed *P. pardalinus* together with the species of Pamexis. But I have corrected this in Stett. Zeit., 1860, p. 361, and 1866, p. 457.

9. *Pamexis contaminatus* Burm.

McLachlan (Review Myrmel. de Rambur) notes for this species that there exists an error in my Synopsis, as the *M. contaminatus* Burm. is a North American species. But he has overlooked that in my Synopsis, p. 433, is quoted *M. contaminatus* Burm., a species only named Vol. ii., p. 995, but the differences stated from *M. irroratus* from S. Carolina. This species belongs to Macronemurus, Synopsis, p. 424. The type is before me. Besides, Synops., p. 433, quotes *M. contaminatus* Burm., *coll. Winthem*, said to be *Pamexis contaminatus;* Synops., p. 457, it is quoted with this name and the locality, Orange River. In the introduction of the Synopsis, p. 370, is stated: "Sometimes collection-names of undescribed species are quoted, soon to be published, or for another reason." The publication was prevented by my going to America a few months later. The species, of which the type with the name in Burmeister's hand-writing is before me, belongs to a genus so far distant from the N. American species, that it seemed to be not inconvenient to retain Burmeister's name, though he had in his publication not even mentioned it, as is stated by the words [from Winthem's collection]. Now *Pamexis contaminatus* is from the collection of Drége, and as his insects were sold to many museums and collections, I believed that Burmeister's name would be found in other collections, and did retain it for this reason. *Pamexis contaminatus* is identical with the type of Rambur's *P. pardalinus*. This identity was only recognized by my study of the type after the publication of my Synopsis, in which *P. pardalinus* Rbr. is quoted with *P. pardalinus* Br. As the description of Rambur is sufficient, and the identity with Burmeister's species is beyond doubt, I believe that the name *P. contaminatus* can be accepted, instead of coining a new name for it, and therefore I propose to name it *P. contaminatus*.

10. *Pamexis luteus* Thunbg.

The figure and the description of this species (perhaps the type is still in existence, but since it was nearly fifty years ago that I saw Thunberg's collection, I would not state more) belong to *M. venosus* Burm., which after a careful study subsequent to the publication of my Synopsis, I find is identical with *M. conspurcatus* Burm.; both types in the Winthem collection. Rambur's species, after the study of the type, I find is the same with *M. venosus* Burm.

NOTE ON ABBOT'S SPECIES IN THE BREMEN MUSEUM.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

In the Bremen Museum are specimens collected by Norwich in the Southern States in the beginning of the century, which bear evidence of having been determined by Abbot, as there are one or two MS. names credited to him. I note here merely a ♀ specimen of *Parorgyia leucophœa;* this is paler, the outer line followed by brown shadings, as compared with our Northern *Clintonii*, and agrees with a specimen collected by myself in Alabama, and previously described in CAN. ENT. There is then no doubt that our Northern *Clintonii* is a valid species. There is also a specimen of *Catocala neogama.* This bears out my statement that *neogama* is distinct from our Northern *communis* Grote (= *neogama* Guen. nec Abbot). The hind wings are lighter yellow as figured by Abbot, while our Northern *communis* has them of a dusky ochrey yellow, and there are a number of other comparative characters whereby the two may be separated. I should then be disposed to consider all determinations of our Northern species as *neogama* to be incorrect. I may take occasion later on to allude to other species from the Southern States in the Bremen Collection.

NOTE ON MISTAKEN IDENTIFICATIONS.

BY A. R. GROTE, A. M.

In the course of my studies I have been able to point out a number of cases in which the species illustrated by earlier authors have been identified with allied forms inhabiting the Middle and Eastern States and parts of Canada, I must think wrongly. Dr. Harris has furnished a number of instances in point, chiefly, perhaps, in interpreting the figures of Abbot. It must not be forgotten that the locality has much to do with the forms of Lepidoptera. The different climate and physical conditions of the Southern States could not fail to impress the Lepidopterous fauna of that region. The topography of the country, the climate, as, indeed, I say on page 215 of the CAN. ENT. for 1886, must be duly considered in this question of related forms. In his writings Dr. Harris describes our Northern *Phlegethontius celeus*, for the more Southern species *carolina.*

He identifies our *Philampelus pandorus* with the species *satellitia*, which seems to be South American, and not to occur within the limits of the United States, or, as we write, North America. Equally in the smaller moths he wrongly identifies his *(Parorgyia) achatina*, which is not Abbot's species, but our northern *Clintonii*. In the *Noctuidæ* his identification of his *Apatela americana* with either of the forms figured by Abbot is, at least, probably premature. Abbot's drawings, which I have studied as closely as possible, make it probable that there are two Southern species of *Parorgyia*, *leucophæa* and *achatina*, not found in the North, and I believe I have correctly identified the former in two female specimens, one of which I found in Alabama.

While writing, I am reminded of another curious identification of Dr. Harris's in the *Coleoptera*. He says, House Report, April, 1838, p. 72: "In France, a large insect, called *vinaigrier* (CARABUS *auratus* L.), devours the female *Melolontha vulgaris* at the moment when she is about to deposit her eggs. I have taken one specimen of this fine *Carabus* in Massachusetts." No other author I have seen refers to this identification of an American species with the European *C. auratus*.

Abbot's work must be studied in connection with Southern collections, and his observations be verified in all stages, before we can be quite sure in all instances that we have his species before us. That he sometimes "mixes" his species is, I have thought, proved by his plate of *Catocala amasia*, where he gives us different species for sexes of the same; and this may not be the only instance. Among Abbot's smaller moths, I have at least identified correctly his *(Adita) chionanthi*, a Noctuid sparingly found in New York State, but which is so plainly marked that the identification can be relied upon.

Leaving Dr. Harris and coming to Guenèe, there is no doubt now (after freshly comparing Southern specimens) that this eminent writer wrongly identified our Northern species *Catocala communis* Grote, with Abbot's *neogama*. The typical form of *communis* as it occurs with us has the primaries of an obscure smooth olivaceous gray with distinctly *brown* markings; the hind wings dusty ochrey or brownish yellow. *C. neogama* has the fore wings black shaded over paler, purer gray with bright yellow secondaries. While the two are of a similar size, there seem also certain differences in the band of the hind wings. As I originally pointed out. Guenèe also mistakes Abbot's *vidua*. It seems to me probable, however, that the *vidua* of Guenèe, or *viduata*, which I have called *Catocala*

Guenèi (to avoid all further confusion and because Guenèe's alteration is unessential and merely covers a wrong identification) has been sent to Europe as *vidua* of Abbot, either by Abbot or determined as after Abbot by collectors in the Southern States at the commencement of the century (1800). Abbot, I have said, figures probably what Guenèe calls *desperata*. But it is not essential to recover now this name of Abbot's. It was applied at a time when black winged Catocalæ were a great rarity and when the number of species now known was not guessed at. When we know all the Southern forms *ab ovo*, then it is time enough to be certain what Abbot meant by *vidua*. If my supposition that thereby he intended our *desperata* turn out correct, later lepidopterists may make the change, I call our Northern species *desperata* Guen., and Guenèe's *vidua*, which I have proved not to be Abbot's and have certainly identified, GUENEI.

HINTS ON COLLECTING HYMENOPTERA.

BY W. HAGUE HARRINGTON, OTTAWA.

To have the specimens in a collection look well, and at the same time be in a condition such as to render their examination as easy as possible, it is necessary that they should be properly collected. The ordinary cyanide bottles prepared either with plaster of Paris, or sawdust, which are used for Lepidoptera and Coleoptera, do not furnish good specimens of Hymenoptera, and those collected in alcohol are less satisfactory. I have found the method advised by Dr. Williston (Psyche, vol. iv., p. 130) for collecting Diptera, so satisfactory that I will quote a portion of his description :—

"I select several two-ounce, wide-mouthed bottles of the same form, and carefully line the bottom and sides with a good quality of blotting paper. Good firm corks are selected, which are interchangeable in the different bottles; in one of these corks a small hole is made, in which it is better to fit a small metallic ferule; a strip of blotting paper is then coiled within this cavity, and it is over this that a few drops of a solution of cyanide of potash is poured."

For those who may not desire to keep on hand a solution of this poison, I would suggest a modification of this method which I find very

satisfactory. Scrape a few grains of cyanide into the cavity in the cork and then insert a small wad of damp cotton wool or sponge. The fumes will be readily given off, and it is only necessary to occasionally renew the cyanide. As Dr. Williston suggests, it is well to have several bottles, but it is sometimes impossible for the collector to take more than the minimum amount of apparatus, and he will then limit himself to two, reserving one of them for delicate or small insects. Bees should never be placed in a bottle with previous captures, as honey is often disgorged, and the specimens greatly injured by the matting of pubescence and soiling of the wings; the pollen which the bees so generally carry is almost as bad in its effects. The safest and most desirable plan is for the collector to carry a supply of small pasteboard pill boxes, and transfer his specimens frequently to these, putting only one specimen of such insects as Bombus in a box. These boxes can be obtained of very small sizes, permitting a sufficient number to be packed in a small space. Their use ensures perfect specimens and enables the collector to keep a better record of them by numbering the boxes, and in his field note-book entering full particulars of the contents of each. When possible, it is better to pin the insects before they stiffen, but if time or circumstances do not permit of this, they will keep safely in the boxes, and may be at any time easily relaxed in a damp atmosphere, care being taken not to allow them to become wet. In pinning it is not at all necessary to set the wings and feet symmetrically, unless one has plenty of time and desires pretty specimens. The wings, however, should be separated, so as to admit of a full examination of the venation both of the anterior and posterior ones, and of the metathorax and the basal segments of the abdomen.

BOOK NOTICES.

It is a cheering sign of the zeal and energy and ability that are being brought to bear upon Entomology that there should be so rapid an increase in the literature of this department of Natural Science. Though several works of importance have been recently noticed in these pages, there are still many others which we desire to acknowledge, and to bring before the notice of our readers. This, however, we can do but briefly, as so much space has of late been given up to literary notices.

The first work on our list is :—

THE BUTTERFLIES OF NORTH AMERICA. By W. H. Edwards. Third Series, Part II., 4to. Houghton, Mifflin & Co., Boston, Mass.

The second part of the new series of this superb work contains the usual three exquisitely finished coloured plates of butterflies. The first illustrates the Californian *Colias Harfordii* Hy. Edwards, and its variety *Barbara*, giving no less than nine pictures of the imagines, and more than a dozen of the earlier stages ; the second *Argynnis Coronis* Behr., giving both the upper and under surfaces of the male and female of this beautiful Californian species, which extends northward as far as our own North-west Territory, where it has been taken by Capt. Gamble Geddes ; the third plate fully illustrates all the stages of *Neonympha Gemma* Hubn. and *N. Henshawi* Edw. There is the usual letter-press description of all the species figured, and also a notice of *Argynnis Callippe* Boisd. It is hardly necessary to add that no Lepidopterist's library can be considered complete without a copy of this admirable work.

REPORT OF OBSERVATIONS OF INJURIOUS INSECTS and Common Farm Pests during the year 1886, with Methods of Prevention and Remedy. By Eleanor A. Ormerod, 8vo., 112 pages. London : Simpkin, Marshall & Co.

We must congratulate our esteemed friend upon the publication of her Tenth Report. It is full of interesting matter and well illustrated with excellent wood-cuts, chiefly the work of the talented authoress. The principal noxious insects treated of are "Earwigs" affecting cabbage—a pest that we are happily free from in this country ; Clover Weevils, the Hessian Fly and other wheat insects, the Hop Aphis, Mustard Beetles, the Horse and Ox Warble-flies, etc. Economic Entomologists everywhere may learn much from these pages ; though the insects treated of are for the most part British, many of them have been transported to this side of the Atlantic and to other distant regions, where they have wrought incalculable damage to crops of various kinds.

SYNOPSIS OF THE HYMENOPTERA OF AMERICA, NORTH OF MEXICO. By E. T. Cresson. Part i. Families and Genera. 8vo., 154 pages.

This valuable work, published as a supplementary volume by the American Entomological Society in Philadelphia, is a very much needed contribution to the literature of this difficult order of insects. With this

assistance towards classification, we trust that many will be encouraged to collect and study these particularly interesting creatures.

TRANSACTIONS OF THE AMERICAN ENTOMOLOGICAL SOCIETY, and Proceedings of the Entomological Section of the Academy of Natural Sciences. Philadelphia. Vol. xiii., 1886.

This volume is replete, as usual, with papers of high scientific value by such well-known authorities as Dr. Horn on Coleoptera, Messrs. Ashmead, Blake and Howard on Hymenoptera, the Rev. Messrs. Holland and Hulst on Lepidoptera, and Mr. Williston on Diptera.

THE MULBERRY SILK-WORM; being a Manual of Instructions in Silk Culture. By Prof. C. V. Riley. Bulletin No. 9. Division of Entomology, U. S. Department of Agriculture.

OUR SHADE TREES AND THEIR INSECT DEFOLIATORS; being a consideration of the four most injurious species which affect the trees of the Capital; with means of destroying them. By Prof. C. V. Riley. Bulletin No. 10.

The species referred to are the Elm-leaf Beetle (*Galerucha xanthomelæna* Schrank.); the Bag Worm (*Thyridopteryx ephemeræformis* Haw.); the White-marked Tussock-moth (*Orygia leucostigma* Sm. & Abbot); and the Fall Web-worm (*Hyphantria cunea* Drury).

REPORTS OF EXPERIMENTS WITH VARIOUS INSECTICIDE SUBSTANCES, chiefly upon insects affecting garden crops, made under the direction of the Entomologist. Bulletin No. 11.

MISCELLANEOUS NOTES ON THE WORK OF THE DIVISION OF ENTOMOLOGY for the season of 1885. Prepared by the Entomologist. Bulletin No. 12.

These four works abundantly testify to the value of the Government Commission on Entomology at Washington, and to the ability and industry of its members.

ARSENICAL POISONS FOR THE CODLING MOTH (*Carpocapsa pomonella* L.) By Dr. S. A. Forbes, State Entomologist of Illinois. Bulletin No. 1.

Another valuable contribution to Economic Entomology, the result of careful and painstaking work in the field.

CORRESPONDENCE.

USE OF CHLOROFORM IN COLLECTING.

Dear Sir,—In the article of Henry S. Saunders, on Collecting at the Electric Light (CAN. ENT., Feb., 1887), he gives his experience in the use of cyanide of potassium and chloroform as follows: "Cyanide of potassium I found the best poison; a few drops of chloroform on cotton would quiet them more quickly, but was more troublesome, the chloroform having to be frequently renewed, occasionally as often as four or five times during the same evening, and sometimes even then the moths would be found alive the next morning."

I should like to explain my method of collecting with chloroform. I have found it better than any other, whether at the electric light or in the field:

Take a glass fruit jar, one in which the lid screws down upon a rubber cushion or packing. Put a bunch of cotton in the bottom, retaining it in its place by pressing down upon it a circular piece of pasteboard, made to fit tightly in the jar, except that two or three notches should be left in the edge for the chloroform to run through to the cotton. Saturate the cotton with chloroform and screw the lid down tight. The bottle is now ready for use, and it will be found that an insect dropped into it will be suffocated almost instantly by the fumes of chloroform that completely fill the bottle. A feeble flutter for a second, a kick or two, and all is over. As soon as the insect is dropped into the bottle, screw the lid down again, and as it fits air tight, the chloroform will not evaporate too rapidly. Less than a teaspoonful will last for a whole evening's work. If on retiring from the work the chloroform seems nearly exhausted, it would be well to pour in a few drops more, and then close the lid for the night. If these precautions are taken the insects will never revive.

Chloroform, when used in this manner, will be found to possess many advantages over any other poison. It is quicker in its action, much more convenient, and under all circumstances entirely harmless. I use this form of collecting bottle both for the electric light and in the field. The bottle will contain, without injury to the specimens, the captures of a whole evening, or a whole day.

If, through carelessness, so much chloroform has been poured into

the bottle as to saturate the pasteboard on which the specimens rest, their wings may become moistened and somewhat damaged. To prevent accidents of this character, pack a bunch of crumpled newspaper tightly down on the pasteboard before putting in any specimens; the paper will be dry, and will prevent the insects from coming in contact with the moist pasteboard.

For Coleoptera I use a morphine bottle prepared in the same way, except that the newspaper is not wanted, and it is closed with a cork. I always carry such a bottle in my pocket ready primed, and thus am always prepared for preserving any specimens captured incidentally while engaged in other affairs.

J. A. Jackson, Des Moines, Iowa.

FOSSIL BUTTERFLY FOR SALE.

In order to illustrate more fully his forthcoming work on New England Butterflies, the undersigned offers for sale for Two Hundred and Fifty Dollars, that wonderfully preserved Fossil Butterfly, *Prodryas Persephone*,

of Colorado. The accompanying cut gives a rude impression of it. Less than twenty specimens of fossil butterflies are known in the world, and this is by far the most perfect and best preserved.

Samuel H. Scudder.

Cambridge, May 9, 1887. [adv.]

The Canadian Entomologist.

VOL. XIX. LONDON, JULY, 1887. No. 7

ABOUT NAMES.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

I have read, as all of us have, the review of a book by C. J. Maynard, on our Butterflies, by Mr. W. H. Edwards, and which appeared in the February number of the CANADIAN ENTOMOLOGIST. Whatever Mr. Edwards writes is trenchant and to the point, so that we have received the impression that Mr. Maynard's book is really not what it ought to be, is not up to current scientific knowledge, and is inferior in its illustrations. There is no more to be said about the book on this head; its publication will probably do very little real good, except perhaps that here and there a reader into whose hands it may chance to fall may have his interest excited in the subject, and so be led to buy a better one, as, for instance, that of Prof. French, to say nothing of Mr. Edwards's splendid volumes. But I was interested in Mr. Edwards's remarks about the names of butterflies, in which the critic leaves his prey to "regret to say that Mr. Scudder is our greatest sinner in this respect" (p. 39). Mr. Scudder, who never defends himself, might well need a champion as far as I understand the average opinion of students. I am all unworthy to assume such a rôle, and am not at all called upon to do so, nevertheless as what I have to say is rather in mitigation of his offence, I must be regarded somewhat in that light. And first, we are all sinners, miserable sinners, as the Church puts into our proper confession, but I doubt if it is right for us to apply the word *inter nos*. There has been quite a shower of adjectives unenlivened by wit, as well as of censure unredeemed by humor, and often unexcused by candor, in our entomological press, and to this I have, in my humble way, quite strongly objected. We are not authorized by our positions to assume so much, nor is our subject sufficiently important, as the world goes, to warrant the issue of ukases upon entomological topics. The particular offence of Mr. Scudder in the matter of names is that of the English ones. Now English names for insects existed before Latin ones, as might indeed be

supposed. I think it is De Saussure who assures us of the ultimate triumph of the English tongue in the contest for existence between the languages, and it is a matter of at least secondary importance that the English names of our butterflies come into use. A butterfly has as good a right to an English, or common name, in an English speaking country, as a plant. And plant names are part of our literature, of our poetry. Perhaps what I said in the "Popular Science Monthly" might be repeated here. The introduction of common names for our Lepidoptera is evidently a matter not to be forced, but to be left to itself. The rule of priority which Linnæus appointed to govern Latin names cannot obtain here. Some of our butterflies have received several English names, as our "Milk-weed butterfly." Some of the names for moths in use in England are very pretty, such as the "Arches" and "Wainscots." English names will, it is to be hoped, gradually appear in our American literature and come into use. The vernacular names proposed in our economic works, mere translations from the Latin, are often very ugly and have nothing to commend them. But see what lovely names they have in England for their moths! The "Kentish Glory," the "Peach Blossom," the "Buff Arches," the "Common Wainscot." About the vernacular names for our moths must come the cooling touch of time; they cannot be struck out in the heat which accompanies the coining of a Latin name for a new species (struggling for priority). Around their cradle some tutelary divinity must hover; some old and idle tale, like an ancient crone, must be its nurse; out of some melody, dedicate to fields and flowers, must the words be taken which are to serve as the common title of the insect haunting these pastures. And not the first but the best known, and in itself the best name, must be chosen, and to exercise this choice there must be some literary taste in the writer, some quaint appositeness in the name itself. Here, in Germany, with its wonderfully supple language, and the frequency of compound words, common names have been easily made and pass current. My young friend Eugene, as to trusting whom with a cyanide bottle I feel some scruples, talks quite glibly and confidingly to me about the "Grosser" and "Kleiner Fuchs;" the latter he has not been able to catch yet, but he knows how it looks from his little handbook, which has fairly good figures and the common name preceding the Latin one for each species. It seems to be a fact, and I do not see how Mr. Edwards can get around it, that young ento-

mologists, *aetat* 10 for instance, prefer their living nursery language to the dead one from the tombs. And we are well counselled to remember the little ones always! What would I not have given to have known the common names for our insects on Staten Island in the fifties!

What Mr. Maynard may choose to call our butterflies cannot be thrown up against Mr. Scudder, who, as I understand it, has merely proposed corresponding titles for our butterflies with those used in England, as the "Blues" and "Coppers," using these names in somewhat of a generic sense and supplying some fresh titles of his own, whether fortunately or not, I am not here enquiring. This is a matter subject to a later review on occasion. Certainly we must be guided by some general agreement with English names in use in England for similar but different species, and this without a too vigorous enquiry. Certain hairy caterpillars in England (and in Germany also) are called "Bears" (I don't know what brings Bacon's curious sentence, "the body of nature is elegantly and with deep judgment depicted hairy," etc., into my mind), and there are certain common names used in a generic way from resemblances occurring to the casual observer. These we must use, and for my part I think that, in a natural way, we shall come into using certain common names as collecting becomes popular among the young and as popular books increase with us.

Far more than on this head am I concerned about Mr. Scudder's proposed book on our butterflies. I think there is a mean between Mr. Scudder's Latin nomenclature and that of Mr. Edwards, which latter is based on Doubleday's, and perhaps since Doubleday we may have advanced in our knowledge as to the structure of butterflies, and are authorized to express this advance in our Latin names. It is many years ago since Mr. Robinson and I set about classifying our Diurnals, and this was before Mr. Scudder's classification. I only published about that time the genera *Feniseca* and *Calephelis*, and as these are not objected to, I think that what I here say, with great diffidence, is entitled to some consideration on both sides. I am quite satisfied, and was before Mr. Scudder, that our Hackberry butterflies, *celtis*, *clyton*, etc., do not belong to the European genus *Apatura*, and that the structural characters separating the two are real and of generic value. Also am I of opinion that our eastern *arthemis*, *ursula*, *disippus*, *eros*, form a group of themselves, distinct from *Limenitis* proper, and that Mr. Scudder's

term *Basilarchia* should be retained. On the other hand I think Mr. Scudder's divisions of *Argynnis* and *Lycaena* are not valid, as now shown by Prof. Peabody and others. I hope Mr. Scudder will not retain these, and also that he will be guided by Dr. Speyer's classification of the *Hesperidae*. These latter afford good, apparent, readily understood generic characters as we understand these in the moths, and there is nothing gained by making too many genera out of them on "measurements." These latter are now proved to be illusory, and should not be again brought forward. As to the general arrangement of the families, the arrangement of Meigen and others, commencing with the groups in which the front legs are useless for walking, and which are taken out of the ambulatory series, has an approved philosophic basis. It is warranted under Prof. Dana's theory of cephalization. Mr. Scudder's paper on the structure of *Papilio* in the Transactions of the American Entomological Society, has not been answered. I think the caterpillars of *Papilio* are of a lower type than those of the rest of the true butterflies, and that there are no reasons for placing the "Swallow Tails" at the head of the rest except that they are large and showy insects. The structure of the feet is evidently of importance no less than the method of pupation, and this is recognized consistently in Mr. Scudder's arrangement. There is certainly no system in commencing with the groups with six walking legs, then following with those of four, and winding up again with those with six. The moths have generally six walking legs, and the abortive front pair may be consistently regarded as a later phase. I have great confidence in Mr. Edwards's remarks as to genera, that these can be traced in all stages from the egg upwards, and in this respect it would be well if Mr. Scudder, for the sake of reason, which, as Zschokke says, is the "daylight of the mind," would abate from hair-splitting. But I have great regard for Mr. Scudder's general appreciation of classificatory characters and those which point to higher or lower rank and which determine the confines of large groups, and on this head it would be well if Mr. Edwards relented from his present views. There is then, to my mind, a possible agreement between the two authorities, and that such an agreement would be of great value cannot be doubted. Where there is any reasonable principle involved, I advise neither to give way. Time, Mr. Strecker's friend, must level such differences by throwing more light on the subject. But much that divides the two scientists lies in the

wide domains of unreason, upon which we all trespass during our earthly journeyings, and where many of us, I am afraid, almost permanently reside.

STUDIES OF THE NORTH AMERICAN PROCTOTRUPIDÆ, WITH DESCRIPTIONS OF NEW SPECIES FROM FLORIDA.

BY WILLIAM H. ASHMEAD, JACKSONVILLE, FLORIDA.

Sub family PLATYGASTERINÆ.

In this second paper on the North American *Proctotrupidæ*, I have taken up the sub-family *Platygasterinæ*, comprising, for the most part, small black species, all parasitic in larvæ belonging to the Dipterous families *Cecidomyiidæ* and *Tipulidæ*.

It will be seen that I have recognized in our fauna species in all of the described genera but *Iphetrachelus* Haliday, and one new genus parasitic on Cecidomyious hickory galls.

XLVI. *Iphetrachelus* Haliday.

XLVII. *Allotropa* Foerster.

74 (1). *Allotropa Americana*, n. sp.

♂. Length, .07 inch. Black, sub-opaque, finely punctate, scape and legs pale brown. Antennæ 9-jointed, terminating in a 4-jointed club, joints serrate, flagellum and club dark brown. Mesothorax with two grooves. Scutellum convex, rounded posteriorly. Abdomen black polished, first and second segments striate, the second segment greatly lengthened. Wings hyaline.

Hab.—Florida.

XLVIII. *Metaclisis* Foerster.

75 (1). *Metaclisis belonocnemæ*, n. sp.

♀. Length, .07 inch. Black, finely punctate. The 10-jointed antennæ and legs pale brown. Thorax with two grooves. Wings hyaline.

Hab.—Florida.

Described from one specimen, reared in April, 1883, from galls. *Belonocnema Tretæ* Mayr, probably parasitic on a Cecidomyious guest fly inhabiting this gall.

XLIX. *Monocrita* Foerster.

76 (1). *Monocrita melanostropha*, n. sp.

♀. Length, .08 inch. Black, sub-opaque, finely punctate, middle of mesothorax and the somewhat flattened scutellum, polished. Antennæ entirely black, terminal joint one-third longer than the preceding joint. Mesothorax with two grooves. Legs red, the femora obfuscated or blackish. Abdomen polished black. Wings hyaline, submarginal vein black.

Hab.—Florida.

77 (2). *Monocrita Canadensis*, n. sp.

♀. Length, .14 inch. Black, head and prothorax finely punctate. Antennæ 10-jointed, filiform antennæ with the legs are pale brownish yellow. Thorax with two deep grooves, converging and almost meeting posteriorly. Scutellum slightly convex, punctate, pubescent, separated from the thorax by a deep depression. Wings fuscous.

Hab.—Canada. Kindly given me by Mr. W. H. Harrington.

L. *Isostasius* Foerster.

78 (1). *Isostasius musculus*, n. sp.

♀. Length, .04 inch. Black, polished. Ocelli distant from inner border of eye. Antennæ 10-jointed, black, club 4-jointed, the joints broader than long. Thorax without grooves. Legs black, femora at base and tarsi reddish. Abdomen ovate, not quite as long as the thorax, and but slightly compressed from above. Wings hyaline, submarginal vein black; no other veins.

Hab.—Florida.

LI. *Inostemma* Haliday.

79 (1). *Inostemma Horni*, n. sp.

♂, ♀. Length, .06 to .07 inch. Black, sub-opaque, microscopically punctate. Antennæ 10-jointed, entirely black. The horn in female is prolonged over the thorax, extending to base of ocelli, gradually narrowed at base. Legs black, tarsi pale brown, in some specimens the tibiæ are pale at tips. Abdomen acuminate ovate, longer than head and thorax combined. Wings hyaline, submarginal vein black. The male is without the projecting horn, and is difficult to distinguish from other species in this group, the shape of the abdomen, which is acuminate ovate, less depressed than any others, and the basal ocelli, which are contiguous to the

inner border of the eye, must be depended upon to separate it. The mesothorax has two delicate grooves.

Hab.—Florida.

This species is dedicated to my friend, Dr. Geo. H. Horn, the distinguished American Coleopterist. It is at once distinguished from the European *Inostemma Bosci* by its stouter form, shorter horn; in that species the horn projects over the entire head; and by its differently colored legs.

80 (2). *Inostemma Cressoni*, n. sp.

♀. Length, .09 to .10 inch. Robust, black, finely punctate. It is at once distinguished from *I. Horni* by its larger, more robust form, its much stouter horn, which is of a uniform thickness throughout, not narrowed at base, and by having rufous colored tibiæ and tarsi.

Hab.—Florida.

Described from two specimens and dedicated to my friend, the learned American Hymenopterist, Mr. E. T. Cresson.

81 (3). *Inostemma Rileyi*, n. sp.

♂, ♀. Length, .04 inch. Black, polished. This species is at once distinguished from all others by its much smaller size, rufous colored femora and tibiæ, sometimes obfuscated in the middle, and the horn in female extends only to the base of the head.

Described from ten specimens, and dedicated to my friend, the eminent economic Entomologist, who so ably fills the position of U. S. Entomologist, Dr. C. V. Riley.

82 (4). *Inostemma Packardi*, n. sp.

♀. Length, .07 inch. This species is at once distinguished from the others by the brevity of its horn, which reaches only slightly beyond the middle of the thorax and obliquely truncate at tip, not rounded as are the tips in the other species. Head and pleuræ punctate. Antennæ black, scape reddish at base. Legs red, coxæ at base black. Wings hyaline, submarginal vein black.

Hab.—Florida.

Described from one specimen, and dedicated to my learned friend, Prof. A. S. Packard, from the study of whose excellent work, "Guide to the Study of Insects," I early derived so much benefit and imbibed some of my love for the study of insects.

LII. *Acerota* Foerster.

83 (1). *Acerota opaca* Prov. Add. et Corr. a la Faune Hym., p. 184.
Hab.—Canada.

84 (2). *Acerota caryæ*, n. sp.

♂, ♀. Length, .07 to .09 inch. Black, shining, microscopically punctate. Antennæ and legs pale yellowish-brown. The four-jointed antennal club is black or brown, in the male the antennæ are generally uniform yellow-brown. The mesothorax has two faint grooves on its disk; scutellum prominent, slightly pubescent. Abdomen smooth, polished. Wings hyaline.

Hab.—Florida.

85 (3). *Acerota Floridana*, n. sp.

♀. Length, .07 inch. Black, antennæ and legs dark red; two grooves on mesothorax; scutellum sparsely pubescent; metathorax with denser, longer, white pubescence. Wings hyaline.

Hab.—Florida.

LIII. *Catillus* Foerster.

86 (1). *Catillus maculipes*, n. sp.

♀. Length, .03 inch. Black, polished. Antennæ and legs rufous, femora and tibiæ with dark blotches above. Mesonotum without grooves. Wings hyaline.

Hab.—Florida.

LIV. *Xestonotus* Foerster.

87 (1). *Xestonotus andriciphilus*, n. sp.

Female. Length, .07 inch. Black; face finely punctate. Antennæ and legs brownish-yellow. Mesothorax with two sharply defined, parallel grooves. Scutellum not greatly prolonged, but compressed at sides. Wings hyaline.

Hab.—Florida.

Described from one specimen reared from the Cynipidous gall, *Andricus blastophagus* Ashm.

LV. *Amblyaspis* Foerster.

88 (1). *Amblyaspis longipes*, n. sp.

Male. Length, .08 inch. Form somewhat slender, black. Antennæ and the unusually long legs pale yellowish brown; flagellum darker, the

last joint being twice as long as preceding joint, cylindrical, the others narrowed at base. The scutellum is very long, acute, elevated over the metathorax. Metathorax covered with white pubescence. Wings hyaline.

Hab.—Florida.

This species bears a close resemblance to *Amblyaspis aliens* Nees, but the scutellum is longer and more acute.

89 (2). *Amblyaspis Americana*, n. sp.

Female. Length, .04 inch. Black. Antennæ and legs pale brown, posterior femora and tibiæ obfuscated toward tips. The apex of the long scutellum is yellowish, and the hyaline wings have their borders strongly ciliate, differing in this respect from all other species in my collection.

Hab.—Florida.

LVI. *Leptacis*, Foerster.

90 (1). *Leptacis cynipsiphila*, n. sp.

Male and female. Length, .05 to .07 inch. Black. Head in front finely punctate. Antennæ and legs rufous. Antennal club 4-jointed, dusky. Thorax sparsely, metathorax densely covered with white pile. Scutellum with a small acute projecting spine at tip. Wings hyaline, strongly pubescent.

Hab.—Florida. Described from specimens reared from an oak gall.

LVII. *Isorhombus*, Foerster.

91 (1). *Isorhombus hyalinipennis*, n. sp.

Female. Length, .05 inch. Black. Antennæ and legs pale brown; the three-jointed club which distinguishes this genus from *Leptacis*, is black or dark brown. The mesothorax is without grooves, the scutellum slightly pubescent, unarmed. Wings hyaline, almost devoid of pubescence.

Hab.—Florida.

LVIII. *Epimeces*, Westwood.
(= *Ectadius*, Foerst.)

92 (1). *Epimeces Americanus*, n. sp.

Male and female. Length, .04 to .07 inch. Slender, black, shining. The filiform antennæ and legs are dark rufous. Mesothorax with two grooves. Abdomen narrow, elongate, sub-cylindrical, gradually narrowed towards tip, about one-third longer than head and thorax combined. Wings hyaline.

Hab.—Florida.

This species is very much smaller than *Epimeces subulatus* Nees, which it closely resembles. The genus *Ectadius* Foerster seems, without doubt, to be identical with this genus, as I have indicated.

LIX. *Sactogaster*, Foerster.

93 (1). *Sactogaster anomaliventris*, n. sp.

Female. Length, .03 to .05 inch. Black, polished. Antennæ and legs black; tarsi reddish. The joints of the four-jointed antennal club are broader than long. Mesoscutum smooth, without grooves. Scutellum armed with a small acute spine. The second abdominal segment is inflated below, having the appearance of a small globe; the other segments are narrow, cylindrical, and project beyond it in the form of a tail. Wings hyaline.

Hab.—Florida.

LX. *Synopeas*, Foerster.

94 (1). *Synopeas melanocera*, n. sp.

Female. Length, .10 inch. Black, polished. Face, just above insertion of antennæ, grooved, and thence to ocelli finely punctate. Antennæ filiform, black, the terminal joint longer than the preceding. Mesothorax with two grooves. Scutellum with a small spine near tip. Legs dark red. Abdomen as long as head and thorax combined. Wings hyaline.

Hab.—Florida.

LXI. *Anopedias*, Foerster.

95 (1). *Anopedias incertus*, n. sp.

Female. Length, .06 inch. Somewhat robust, black. Antennæ and legs rufous, thighs obfuscated. Antennal club 4-jointed, brown-black. Thorax without grooves. Scutellum flattened, with a spine at tip. Mesopleuræ highly polished; metapleuræ and metathorax densely pubescent. Wings hyaline.

Hab.—Florida.

The structural characters of this species seem to agree with the definition of this genus, but I have doubts as to its belonging here.

LXII. *Isocybus*, Foerster.

96 (1). *Isocybus longiventris*, n. sp.

Female. Length, .04 inch. Black, highly polished. Head large, cubical. Antennæ and legs pale yellowish-brown. Thorax rather short,

much narrower than head, smooth. Abdomen long, acuminate ovate, nearly twice as long as head and thorax combined. Wings hyaline.

Hab.—Florida.

This species is placed in this genus only provisionally, as the non-grooved thorax and shape of abdomen will probably exclude it from the genus.

LXIII. *Trichacis*, Foerster.

97 (1). *Trichacis brunneipes*, n. sp.

Female. Length, .10 inch. A slender, elongate, polished, black species. Antennæ and legs pale yellowish-brown, flagellum and club rust-brown. Mesothorax with two parallel grooves. Scutellum, which is transversely convex, is well separated from thorax by a deep depression, and has a thick tuft of grey pubescence at tip. Metapleuræ densely pubescent. Wings dusky hyaline.

Hab.—Florida.

LXIV. *Hypocampsis*, Foerster.

98 (1). *Hypocampsis Pluto*, n. sp.

Female. Length, .06 inch. This species is highly polished, including antennæ and legs, entirely black. Mesothorax with two grooves. Scutellum rounded, highly convex. Abdomen with the lateral carina broad and turned downwards. Wings hyaline.

Hab.—Florida.

LXV. *Polygnotus*, Foerster.

99 (1). *Polygnotus solidaginis*, n. sp.

Male and female. Length, .05 to .07 inch. Black polished. Antennæ dark reddish-brown, scape paler ; club, female, five-jointed ; male antennæ filiform. Legs dark red, femora black, tibiæ obfuscated. Mesothorax smooth, without grooves. Scutellum elevated, highly convex, more than twice as broad as long, and separated from mesothorax by a deep transverse groove. Wings hyaline.

Hab.—Florida.

Described from numerous specimens reared from a Cecidomyious gall (*Cecidomyia nebulosa* Ashm. MSS.) From six to eight specimens were reared from each fly ; they make parchment-like cocoons, placed side by side, as illustrated by Prof. Westwood on the genus *Platygaster*, " Introd. to Study of Insects," vol. ii., f. 78, No. 14.

100 (2). *Polygnotus baccharicola*, n. sp.

Male and female. Length, .03 to .06 inch. Black, polished. Differs from the above species in its smaller size, more slender form and in having uniformly colored dark red legs. The femora are not black.

Hab.—Florida.

Described from numerous specimens reared from a Cecidomyious gall (*Cecidomyia baccharicola* Ashm. MSS.)

LXVI. *Platygaster*, Latreille.

101 (1). *Platygaster pallipes* Say, Leconte's Ed. Say's Works, I., p. 383. Hab.—Indiana.

102 (2). *Platygaster Canadensis* Prov. Add. et Corr. a la Faune Hym., p. 181. Hab.—Canada.

103 (3). *Platygaster error* Fitch. Sixth Rep. N. Y. State Agr. Soc., p. 818. Hab.—New York.

104 (4). *Platygaster Herricki* Packard. Third Rep. U. S. Ent. Comm., p. 220. Hab.—Western States.

105 (5). *Platygaster Floridensis*, n. sp.

Female. Length, .06 to .07 inch. Black, polished, more slender than *Platygaster niger* Nees. Antennæ and legs of a uniform pale yellowish-brown. Mesothorax smooth. The scutellum is convex, broader than long, and is not separated from the mesothorax by a deep transverse groove, as are the species in the genus *Polygnotus*, sparsely pubescent towards tip. Wings hyaline.

Hab.—Florida.

106 (6). *Platygaster gracilis*, n. sp.

Male. Length, .05 inch. Very slender, polished black. Antennæ filiform, black, scape at base pale brown. Legs reddish, femora obfuscated. Wings hyaline.

Hab.—Florida.

The new genus recognized in this family will be described in another paper, when I hope to be able to give a good illustration of its peculiar characters.

STRAY NOTES ON MYRMELEONIDÆ, PART 2.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

1. *Species figured in A. Seba Thesaurus.*

I have quoted, Synops. Hemerob., p. 457, as belonging to *Pamexis*, a new species figured in Seba Thesaur., vol. iv., pl. 86, f. 20. The explanation says, "Color pallide subfuscus, maculis suture fuscis." I can not here compare a colored copy of Seba's work, nevertheless the figure proves to be a male of a species of *Pamexis* without antennæ. The figures of insects in Seba are not good; but as the species belongs surely to *Pamexis*, and is larger than the other known species, and different from them, I wish to draw attention to the existence of a new species of this curious genus. It is, besides the figure given by Thunberg, the only species figured. Seba's collection was sold in the beginning of the last century to Peter the Great, but as far as I know, was destroyed entirely in St. Petersburg, as well as the collection of Madam Merian, of which only a few of the large Lamellicorns are left. Seba has figured on plate 86 six Myrmeleonidæ, five of which belong to *Palpares*. Fig. 17 is quoted by Linné, Syst. Nat. ed. xii., in the appendix, to be his *Libellula capensis*, p. 904, n. 19. This species belongs certainly to a *Palpares* from Cap. b. sp. Among the species known to me it is near to *P. latipennis;* the quotation in my Syn. Hemerob., p. 456, by *P. latipennis*, f. 5, is a typographical error for f. 17, as Prof. Brauer justly remarks.

Of the four other figures by Seba, is f. 18, a male of *Palpares*, perhaps the unknown male of *P. Caffer*. The fig. 5 is, as Prof. Brauer has proved, Wien. Z. B. Ges, xvii., p. 521, *Myrmeleon sinuatum* Oliv., Enc. Meth., viii., p. 121, No. 4, from Cap. b. sp., which was described only from Seba's figure. The figure well represents *Palp. haematogaster* Gerst., except that the posterior margin of the hind wings is not subfalcate, as in Gerstaecker's species. Therefore Prof. Brauer believes it to be different. McLachlan, Jour. Linn. Soc, ix., 243, has established for *P. haematogaster* the genus *Crambomorphus*, and believes Olivier's *M. sinuatum* to be the same species; but he has apparently at the time not compared Seba's figure, as he would have stated the difference of the hind wings. For the species *P. gigas* Drury, *contrarius* Walk., *moestus* Hag., and *falcatus* McLachlan, this author has established the genus *Symma-*

thetes; but he writes always *P. gigas* Dalman instead of Drury, for which error probably I am responsible. Dalman has only given a diagnosis made from Drury's figure, which diagnosis is so defective that Burmeister applied it to a very different species.

The figures 12 and 13 on Seba's plate belong probably to the genus *Stenares*; as far as I know, they are not yet determined nor quoted anywhere.

2. *Acanthaclisis Americana.*

Drury, Ins., vol. 1, p. 111, No. 4, pl. 46, f. 4. Burm., ii., p. 996, No. 17. Ramb. Neur., p. 380, No. 4. Hag. Syn. Neur. N. Amer., p. 223, No. 1. Taschenberg, Zeitschr. Halle, 1879, vol. 52, p. 186. See for literat., Hag. Syn. Hemerob. Stett. E. Zeit., 1866, p. 378.

Brown, clothed with whitish hairs, stout; front and labrum yellow to the antennæ, whitish villous above; vertex reddish brown with two large flat elevations, separated by a middle impressed line; cut straight in front; anteriorly with a yellow band; on top a black band, and a transversal series of flattened spots, and some behind, two of them approximate in the middle, all black; antennæ strong, a little longer than the prothorax, flattened on tip, black, the joints with a yellow basal ring; the basal joints below yellow. Maxillary palpi short, yellow, the joints a little brownish at base; the third joint longer, thickened on tip, curvate; the fourth a little shorter than the fifth, which is cylindrical, a little curvate on the base, the tip obtuse, very little notched. Labial palpi longer, black, hairy; second joint curvate on the base, thickened on tip; third joint a little shorter, straight, fusiform on tip, which is yellow, or yellow-pointed black, suddenly thinned and pointed. Prothorax a little longer than broad, narrowed in front; side margins straight; front margin sub-convex, with a small median notch; a strong transversal dorsal depression before the middle of the prothorax is a little curvate, more curvate near the side margins; another smaller depression exists near the mesothorax; the prothorax dull grayish brown, with a large black longitudinal median band, and another on each side on the side margin, not well defined; a yellow spot, little visible, each side externally near the anterior depression; prothorax above clothed with long black hairs, and with whitish ones laterally. Mesothorax grayish brown, with a black median band, and another on each side; below the whole thorax is rufous brown, whitish villous. Legs strong, short, whitish villous, mixed with black hairs, blackish brown,

femur brown, a little fallon at base ; tibia blackish externally, with a narrow ring, and a spot more apical yellow ; tarsus black, base of last joint yellow ; spurs brown, as long as the three basal joints, pointed, curvate in demi-circle, but not fractured ; claws brown, after a short, larger base, suddenly curvate. Abdomen strong grayish black, base whitish villous ; end of abdomen black. Wings large, hyaline, similar to *A. occitanica ;* veins black interrupted with yellow ; space between sub-costa and median and space between the fourth and fifth vein nearly filled with brown dots ; some brown apical dots on the small forks of the veinlets ; some brown shadows on the hind margin after the oblique vein ; hind wings a little longer ; space between sub-costa and median a little spotted, and a brown spot on the end of the hyaline space between fourth and fifth vein ; the pterostigma of all wings yellow, internally with a black dot, costal space of front wings in the apical half or two-thirds with a double series of irregular cells ; costal space of hind wings with undivided ante-cubitals ; all wings moderately pointed, hind wings slightly sinuated before tip on hind margin ; all wings on tip with a series of small gradate veins beginning behind the pterostigma, running down in a curve in the middle of this part of the wing and ending opposite to the tip ; in the fore wings are between 15 to 9, in the hind wings 7 gradate veins.

Length of body 47 to 50 m.m. ; length with wings, 64–75 m.m. Exp. al. 110 to 130 m.m.

Hab.—Newbern, North Carolina, coll. by Ordway, presented by Mr. S. H. Scudder ; Millin, Scriven Co., Georgia, near Ogechee River, coll. by H. K. Morrison; Crescent City, Florida, raised by Mr. H. G. Hubbard. The three specimens before me are all females. I have seen besides three females. The type of Prof. Burmeister, from South Carolina, coll. by Zimmermann.* As far as known to me, this specimen was the only one known to exist in Europe till 1867. I have seen it only after the publication of my Synopsis. Further, a female from Florida in Mr. S. Henshaw's coll., and a female from Sandy Hook, New York, in Mr. H. Edwards's coll. As the first specimen described and figured by Drury in 1770 is said to be from New York, Mr. Edwards's specimen is especially interesting. He found it in a small inn, inside near the window, last summer. Mr. L. Cabot told me that he had seen this species several

* The type of Burmeister is described by E. Taschenberg, Zeitschr., 1879, p. 126. It should have been stated CANAD. ENTOM., vol. xix., p. 111, that the type of *P. pardalinus* Burm. has been described l. c. p. 184.

times when hunting in N. Carolina. Mr. H. Garman, from Champaign, Illinois, informed me that he collected three females in the house of the John Hopkins Marine Laboratory, at Beaufort, N. Carolina, inside near the window. Newbern is only a few miles distant from Beaufort. Among my papers I found a description of a female from Columbia, from the collection of Mr. H. de Saussure, in Geneva, Switzerland. This species is quoted without description in my list of South American Neuroptera, p. 324, as *Acanthochisis striata* Hag. The description was made more than thirty-five years ago, when I had never seen the North American species. Now in studying *A. americana*, I was astonished to find that the description of *A. striata* agrees so well that there cannot be any doubt of the identity of the two species. Indeed the description printed above is my old one of *A. striata*, to which I was not able to make additions or corrections after the new material. The specimen was returned at the time to Mr. de Saussure, and will be in his own collection or in Geneva Museum.

The figure of the male by Drury is similar to the female, and is indeed well made. The venation is accurate, and gives also an indication of the gradate series on the tip. The costal space shows a double series of cells to the base, probably an error, as in the specimens seen by me at least the basal third has only one series. The basal knob on the hind margin of the hind wing is wanting in the figure. The anal appendages a little longer than 3 m.m., are slightly bent. The dimensions of the figure are like those of the female; the length of body greater, nearly 60 m.m. The description agrees except that the thorax is said to be yellow, though the figure gives it gray.

(To be Continued.)

A PRACTICAL NOTE ON COLLECTING INSECTS.

BY PROF. E. W. CLAYPOLE, AKRON, OHIO.

In reference to two notes on collecting in the June number of your ENTOMOLOGIST, will you allow me to make a few remarks? Entomology is with me a secondary subject, my time being for the most part occupied with another science. Perhaps this has led me to devise means for economizing time and labor more than I should otherwise have done;

but the study of insects has great attraction for me, and I spend no little time upon it.

The method which I desire to mention may be too well known to deserve any space in your columns—if so, I can only ask you to overlook my intrusion—but I have never seen it mentioned in print anywhere, nor have I ever seen it used by any entomologist of my acquaintance. Perhaps also there may be some objections to its adoption which I have not discovered in the course of several years' use. In that case I shall be glad to learn them.

Your contributors speak of chloroform and cyanide of potassium as their favorite insecticide materials. Both these I have abandoned for some years, the former because it is expensive, and the latter because it is unpleasant and dangerous, especially the latter to young students, and both because they are comparatively imperfect in their effects. For example: I have often known an insect, especially one of the large bodied *Bombycids*, that recovered after having been apparently killed by chloroform, and even after having been pinned out in the case. The result usually is that it is seriously injured by flapping about. Chloroform is an anæsthetic and not a poison, and its effect soon passes off unless its action is renewed or long continued so as to insure death.

In regard to cyanide of potassium, I may state that last year I found one of my cases badly infested with the fur moth *(T. pellionella)*. I put an open bottle containing cyanide of potassium into the case and closed it. For a fortnight it remained so, when desiring to know the result of the poison, I opened it. It was strongly impregnated with the well known smell of the cyanide. To my surprise, however, I could not find a dead moth, and the larvæ were as lively after breathing for fourteen days the so-called deadly atmosphere as if they had been all the time in the open air. As a substitute for both of these I have for years used no other insecticide for the purpose of killing my specimens than benzine or gasoline. The latter at fourteen cents a gallon is merely nominal in cost and perfectly efficacious in action. I use it without hesitation on the Lepidoptera in any quantity. With most of them it causes instant death, and with the few that slightly resist its effects the resistance is very short-lived. I recollect one day seeing a large *Cecropia* moth enter the room where I was sitting and alight on the knob of the door handle. I took my bottle of gasoline and poured some of the liquid on the body of the

insect, when it dropped to the floor as if shot and never moved a wing. The result is not in all cases quite so rapid, but it is never tedious. By this means I prevent the mischief that ensues when a fine specimen flutters in a bottle of cyanide or chloroform for several minutes, as is often the case.

I employ the same plan with all insects, and with equal success. The moths that so long resisted the cyanide vapor, as mentioned above, at once yielded to the deadly gasoline, and in five minutes not a living larva was left in the case.

I need scarcely add that the use of this exceedingly volatile liquid never in the least degree injures the delicate plumage of the Lepidoptera. Many of my best specimens have been repeatedly drenched with gasoline. In five or ten minutes they are as dry as before it was applied.

Let me add one word more. I find the most convenient way of applying the gasoline is to carry it in an ounce phial, having a cork through which passes a finely pointed glass tube. The large outer end of this tube is capped with a small india-rubber capsule. The whole may be bought at a drug store for a few cents, under the name of a dropping tube. In this way the tube is always full of liquid ready to be squirted out on an insect in the net or even at rest in the open air, and the specimen is at once fit to be pinned out. This I do on the spot in a cigar box, or in one lined with cork, and so avoid an accumulation of material, which is a great annoyance to a man whose time is otherwise occupied, or indeed to any one at the end of a hard day's work.

The small weight of the outfit here required is an advantage not to be overlooked when compared with the weight of the loaded cyanide bottle usually employed. There are one or two other points which I should like to mention, but having already written more than at the outset I intended, I will forbear.

CORRESPONDENCE.

BRACHYS AEROSA AND BRACHYS OVATA.

Dear Sir: I notice Dr. Packard, in his "Bulletin No. 7," on "Insects Injurious to Forest and Shade Trees," speaks of *Brachys aerosa* M., as probably mining the leaves of our oaks in its larval state, but says

that its life history is not known. I am not aware that the habits of this beautiful little Buprestid have since been published, and as I have reared two fully developed specimens from the larvæ, I think it may be of interest to the readers of the ENTOMOLOGIST to know the life history so far as I have been able to determine it.

Last Oct., while collecting leaf-miners from not less than twenty different trees and shrubs at the Michigan Agricultural College, I took two poplar leaves from which I got, to-day, the two beetles above mentioned. The following is the description of one of the larvæ made at the time they were taken :

Mining the leaves of our common poplar next to the upper surface. A whitish larva 9 m.m. long, broadest at head and gradually tapering to the tail. Jaws brown and first joint back of head with brown rectangular plates above and below. The anal end with a small black spine extending back which is used by the larva in pushing itself forward. Larva quite flat and segments deeply notched.

B. ovata Web.—A leaf of either the red or black oak containing a leaf-miner was taken at the same time, and from this I got *B. ovata* less than a week ago. No description of the larva was made.

C. P. GILLETTE.

Michigan Agricultural College, May 7th, 1887.

BOOK NOTICES.

RHOPALOCERA MALAYANA : A Description of the Butterflies of the Malay Peninsula. By W. L. Distant. London, 1882–86, 4°, 16 ; 486 p., 46 plates.

A short time ago we called attention to a work in progress on the Butterflies of India. Immediately thereafter there came to hand the final part of another notable work on the butterflies of a region still nearer our antipodes—the Malay Peninsula. In this instance the work was undertaken by the author under peculiarly favorable circumstances, inasmuch as all pecuniary anxiety was removed by the appearance of a Maecenas in the person of Mr. D. Logan, of Penang, to whom all credit is due by naturalists the world over, not only for the generous way in which he has allowed the work to be gotten up and illustrated, but for his excellent choice of an author. For Mr. Distant, on his side, has performed his task

in a very scholarly manner, and given us a book leaving little to be desired, beyond that constant and bitter craving of naturalists for a knowledge of the earlier stages of life of the insects treated. We could indeed wish that the structural characteristics of the larger divisions had been more amply treated, and that the author had not rested satisfied with groupings in the Lycaeninæ and Hesperidæ, newly manufactured, confessedly artificial and temporary, and to which the very descriptions which follow do violence. But the excellence of the entire work, the consistent manner in which the task has been carried out, the technical skill, excellent judgment and broad learning everywhere displayed, as well as the very considerable addition to our knowledge involved, disarms adverse criticism and invites only praise. Would that such a Maecenas and such an author might oftener company together!

The work is published in quarto in sumptuous style, is unexceptionable in typography and profusely illustrated. Besides 46 plates of some of the best chromo-lithographs of butterflies which we have ever seen, there are 129 wood cuts scattered through the text, generally illustrating special structural features, especially in neuration and leg structure, which are of the greatest value. The author, as would have been expected of one of our best lepidopterists, familiar with the structure as well as the early stages, the form and coloring of butterflies, has followed closely in the lines of the classification made prominent in recent years by Bates, in which the Hesperidæ are immediately preceded by their nearest allies, the Papilionidæ. It remains only to say that a good deal of interesting reading will be found scattered through the portly volume, and that there are points in the preface worthy of careful attention. About 500 species are described.

SAMUEL H. SCUDDER.

THE OTTAWA NATURALIST. Vol. i., Nos. 1 and 2, April and May, 1887.

A welcome addition to our few Canadian serials on Natural Science; we heartily wish it abundant success.

A REVISION OF THE LEPIDOPTEROUS FAMILY SATURNIIDÆ. By John B. Smith. Proceedings of the United States National Museum. Washington, Dec., 1886.

A very valuable illustrated paper on this interesting family of moths.

The Canadian Entomologist.

VOL. XIX. LONDON, AUGUST, 1887. No. 8

ELAPHIDION VILLOSUM, Fab.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

The account of this insect given by the early fathers of Œconomic Entomology is so charming that it seems almost profane to disturb a history accepted by most of their credulous offspring with unquestioning faith. Its wonderful habits and supra-rational instincts have been stock in trade ever since, and, like the fiction of the fly walking on glass by a sucker arrangement of its feet, is likely to hold its place in paste and scissor literature for all time to come.

Divested of all romance and imagination, and descending to facts, the observations of Professor Peck, Fitch and Harris may be reduced to this. In the month of July the parent lays the eggs on the limbs, or in the axil of a leaf near the end of the twigs of that year's growth of various species of oak, and perhaps other trees. After hatching, the young larva (in the latter case) penetrates to the pith and devours it downwards till the woody base is reached, and so onward to the centre of the main limb; here it eats away a considerable portion of the inside of the limb, and then plugging the end of the burrow, which it excavates towards the distal end, eventually falls to the ground with the limb, which being weakened, is broken off by the high autumnal winds. They exist here either as larvæ or pupæ till spring, and emerge in June as perfect beetles. Time, one year, though not so stated in words.

The account given in detail below is so different from the above, that were the identity of the individuals not established by actual comparison and by recognized authority, it might well be asserted I had given an account of some other *Elaphidion.*

April, 1883, I procured a barrel of hickory limbs from a tree girdled early in 1882; the limbs were from one-half to one inch in diameter. Very few things developed from them that season; but the next (1884) quite a number of species came forth—*Clytanthus ruricola* and *albofasciatus*, *Neoclytus luscus* and *erythrocephalus*, *Stenosphenus notatus*, etc.

Many larvæ of some Cerambycide continued to work on under the bark ; late in the fall I observed the most of these had penetrated the wood, but some remained under the bark till April and May of the next year (1885). The most of the beetles appeared during the first two weeks of June, though individuals occurred occasionally till September. A few larvæ were still found at work, but by October they, likewise, had bored into the wood and appeared as beetles the next June (1886). The normal period of metamorphosis is therefore three years, but in individuals it may be retarded to four or more years.

At the present writing (June 5th) these beetles are issuing in great numbers from a barrel of hickory limbs obtained in April, 1885, from a tree deadened in January, 1884, thus verifying the first observation.

How the larvæ get under the bark could not be ascertained. When first examined, in April, they were from 4 to 5 m.m. long ; they ate the wood under the bark, following its grain, and packed their burrow solidly with their dust. Their growth and progress were both slow, for by the next April they had scarcely more than doubled in length, and had not traveled more than from four to six inches during the year ; but after July they developed an enormous appetite, and consumed the wood for at least an inch in length, and often entirely around the limb, ejecting their castings through holes made in the bark. When full fed, they bore obliquely an oval hole into the wood, penetrating it from four to ten inches. The larva then packs the opening with fine castings and enlarges a couple of inches of the interior of the burrow by gnawing off its sides a quantity of coarse fibre, in which it lies, after turning its head to the entrance. When about to become a pupa (I witnessed the process), the skin ruptures on the dorsum of three or four segments next the head ; the head of the pupa appears, and after about half an hour's wriggling the whole body is divested of its covering. To the observer the pupa appears to crawl out of the skin, but in fact the skin with the large mandibles is forced backwards by the alternate extension and contraction of the segments, assisted materially by the fibre that surrounds it. After its soft body hardens, the same movements free it from the fibre, some being shoved in advance of the head, and some posteriorly, the exuviæ being often found at the distal end of the hole.

The time spent in the pupal state is indefinite, and does not seem to concern greatly the time of the appearance of the beetle. Sticks split open at different periods from December till March contained larvæ and

pupæ about equally, but no developed beetles. A larva that I observed to go into the wood in April appeared as a beetle among the first of such as had presumably pupated in the fall.

The number of these beetles obtained that and the present season was great, and afforded a good opportunity to observe individual variations, and they do differ greatly. In length from 8 to 18 m.m.; in pubescence, some being nearly naked and unicolored, others having it longer and condensed into spots or almost vittate; some being quite slender and elongate, while others are short and broad; the surface of the elytra is mostly uniform, but in some, especially such as are narrow and elongated, one or two costæ are more or less evident.

Now, although this account differs so widely from that given by Mr. Fitch, still the beetles are the same. Unfortunately I have never been able to find any pruned oak limbs from which to obtain the insect myself, but I have a good set from Mr. Blanchard, of Mass., presumably from the oak, which are identical. Through the kindness of Mr. F. Clarkson, I have a set of those described by him in the CAN. ENT., vol. 17, p. 188, from oak limbs, and which became imagos in November, and there is no perceptible difference. Dr. Geo. H. Horn says, "they are the same."

To identify *Elaphidion parallelum* had always been a puzzle to me, and I once thought I had a real set; I obtained it about a dozen times by exchange, but could never be satisfied that the specimens received were not pauperized, or peculiar individuals of *E. villosum*. On comparing my hickory insects with all the descriptions of *E. villosum* and *parallelum* and their several synonyms, as far as I possess them, it was easy to pick out sets that would answer satisfactorily all their requirements, and I became satisfied that *E. parallelum* could not be separated.

An inquiry of Dr. Geo. H. Horn elicits the following note and kind permission to use it:

"Regarding the two species of *Elaphidion (villosum* and *parallelum)* of which you write, I can only say that my opinion, based on the series in my cabinet and an examination of those in the cabinet of Dr. Leconte, is that they are inseparable. The slight differences, referred to by Dr. Leconte, in the last ventral segment of the males, are not real but dependent on the angle at which they are seen." The differences referred to are that in *E. villosum* the last ventral segment of the male is rounded, while in *parallelum* it is emarginate. The only other structural difference mentioned by Dr. Leconte is,

" Prothorax scarcely longer than wide—*villosum.*

" Prothorax distinctly longer than wide –*parallelum.*"

From the insects before me from the hickory, it is easy to pick out some with the thorax fully one-fourth wider than long, and others with it one-fourth longer than wide, but they are brought together so insensibly by intermediates, that where the proper separation into species should begin it is impossible to decide. The same may be said of the differences in elongation, narrowness and pubescence; and I can find no basis for retaining *parallelum* as even a racial or varietal name.

I trust the foregoing may stimulate such as have opportunity to investigate the habits of this interesting beetle more thoroughly. I mention some of the points that require clearing up. First, the length of time occupied in the metamorphosis of such as breed in the branches of living trees One year is certainly an error, as it is opposed to the known history of any other Cerambycide having a similar habit. Second, whether the falling of the limb is not accidental, the majority containing larvæ not being weakened enough to break. Third, whether the end of the limb remaining on the tree does not contain the insect equally with that which falls—points that might be determined by cutting down a tree in autumn from which limbs had been pruned. Fourth, to make a collection for comparison from each species of tree infested.

Besides the accounts of Professor Peck, Fitch and Harris, the following bibliography may be noticed:

Haldeman—Trans. Am. Phil. Soc., vol. 10, p. 34.

Larva feeds on the living [?] wood of oak, hickory and chestnut; also dead Abies.

Riley—American Ent., vol. 2, p. 60; *ib.* vol. 3, p. 239.

Larva bores in plum and apple twigs, and in dry grape cane, Missouri Rep., 3, p. 6. Bores into and prunes the limbs of the apple. *Ib.* 4, p. 54. Bred abundantly from injured grape stems.

Rathvon—U. S. Agricultural Rep., 1861, p. 615.

Merely a synopsis of Fitch's account.

Packard, jr.—Bul., No. 7, p. 30. U. S. Entomological Commission.

Scissored from Fitch in full.

Clarkson—Can. Ent., vol. 17, p. 188, and vol. 19, p. 31.

Discovers that the insect completes its metamorphosis in the fall and

early winter, in oak limbs, and takes issue with Peck, Fitch and Harris on several points.

Townsend, Can. Ent., vol. 18, p. 12.

Thinks Mr. Clarkson's discovery the exception, and not the rule, in the time of metamorphosis.

DESCRIPTIONS OF NEW SPECIES OF NORTH AMERICAN HETEROCERA, WITH NOTES.

BY HENRY EDWARDS.

FAM. ÆGERIADÆ.

FATUA PALMII, n. sp.

Allied to *F. denudata*, but differing greatly in important particulars. Fore wings are bright shining seal-brown, deep orange along the costa for the basal half. At the middle of the wing at base is a narrow denuded space, and the internal angle is also devoid of scales, but much more narrowly so than in *denudata*. The transparent space is golden yellow in shade. Lower wings transparent golden yellow, with very bright but dark opalescent reflection. The margin and spot at the extremity of cell dark brown. Antennæ bluish black, orange brown at the base. Head, disk of thorax, and the upper portion of the abdominal segments, black. Eyes black, palpi with black at their base. Front of head, collar, sides and base of thorax, posterior edges of abdominal segments bright orange. Feet and legs wholly orange without any black bands.

Exp. wings 45 m.m. Length of body 22 m.m. 1 ♀. Enterprise, Florida. Taken by Mr. C. Palm, to whom I dedicate the species.

FAM. BOMBYCIDÆ.

LIMACODES BEUTENMUELLERI, n. sp.

Primaries rich chestnut brown, very glossy and mottled with blue metallic scales. Across the median space, and extending along internal margin to base is a deep fawn brown shade enclosing darker shades, and giving a clouded appearance to the wing. The apical part of the margin and the fringe pale fawn drab, passing into darker shade at the internal angle. Secondaries smoky brown, margins paler. Beneath

wings wholly smoky brown, with the apices pale. Head, thorax and abdomen chestnut brown. Exp. wings, 21 m.m. Length of body 9 m.m. Enterprise, Florida. 1 ♀.

I name this beautiful species after its discoverer, Mr. W. Beutenmueller, an earnest and talented entomologist, from whom good work in the future may be expected.

FAM. NOCTUIDÆ.

SCOTOGRAMMA STRETCHII, n. sp.

With much of the general appearance of *Perigea falsa*, Gr., but said by Mr. J. B. Smith to belong to his new genus *Scotogramma*. Dark stone drab, the lines blackish, all much confused, and the ground color of the wing covered with brownish irrorations. Basal half-line indistinct. T. a. line nearly straight, with a deep tooth anteriorly pointing towards the base. T. p. line dentated outwardly and joining the reniform in a darker cloud. Marginal line lost in a row of dark clouds. Intronervule spaces pointed with black lunules. The basal, median and submarginal spaces are pale by contrast with the dark lines. Lower wings dull stone drab, a little paler toward the base. Under side uniform stone drab, with very distinct darker discal spots and a median band common to both wings. Margins also dark. Thorax and abdomen concolorous. Exp. wings, 32 m.m. 1 ♀, 2 ♂. Colorado Desert. R. H. Stretch.

NOTES.

SPHINX CUPRESSI, Bdv.

It has been my good fortune to have the opportunity of examining two specimens (both ♂) of this very rare Sphinx, one taken by Mr. C. Palm, at Kissimmee, Florida, and the other by Mrs. Slosson, at Enterprise, Florida. I have no doubt whatever as to its being a very distinct species. Its color is pale fawn, with some whitish dashes over the primaries, and three brown streaks as indicated in Boisduval's figure. The lower wings are rich brown. Mr. Palm's specimen was taken in a cypress swamp, and Mrs. Slosson's at electric light. Both captures were made in May. It is probably an early insect, as the examples were somewhat rubbed.

PRIONEA LACERTULA, L.

This well-known European moth must be added to our fauna. A fresh specimen was taken by me in July, 1886, at St. John, N. B. I am

inclined to think that this species may be confounded in some collections with *P. bilineata*, examples of which from Nova Scotia are in my collection.

NOTE ON THECLA AUGUSTUS.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

I beg to record the capture, by myself, in the neighborhood of Bergerville, Province of Quebec, of two specimens of *Thecla Augustus*. One of them was taken on the 6th, and the other on the 8th of June. I am indebted to Mr. W. H. Edwards for the identification of the insects.

A figure of *Thecla Augustus* is given by Harris in his work on insects injurious to vegetation, page 279. As he gives no description of the insect, the following may not be unwelcome to some of the readers of the CANADIAN ENTOMOLOGIST:—

Expanse of wings 1 inch. Colour above, umber-brown, darker along the costa, and at the base in fore-wings. At the centre, in the fore-wings, there is a rust-red tinge or blush; and at the anal angle in the hind-wings there is an indistinct spot of the same color. The under-side of the fore-wings is of a lighter shade than the upper. Beyond the centre of the wing is a wavy transverse dark line. The hind-wings on the under-side have a basal patch of dark umber irregularly bordered. The antennæ are ringed black and white.

STRAY NOTES ON MYRMELEONIDÆ, PART 2.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

(Continued from page 136.)

3. *Acanthaclisis Texana* Hagen.

I have a male and two females from Carrizo Spring, Dimmit Co., Western Texas, just near the frontier of Mexico.

Length of body, male, with app., 50 m.m.; female, 45. Length with wings, 65 m.m. Exp. al., 118 to 120.

Very similar in shape and color to *A. Americana*. After long consideration I believe them to be different species, until by a larger material

it shall be shown that the differences given are such that *A. Texana* should be considered to be only a well marked variety.

The differences are :—

1. The vertex is rounded, convex above and before, very slightly depressed longitudinally in the middle. The vertex of *Americana* is strongly flattened above, and cut off sharply anteriorly.

2. The last joint of labial palpi is more thickened, the suddenly coarctate tip shorter and truncate on the extreme apex. The same joint of *Americana* is less thickened, the tip longer and pointed.

3. The prothorax is a little shorter, equally broad in front and near the mesothorax. In *Americana* the prothorax is visibly narrowed before, so that its breadth near the head is only a little more than half its breadth near the mesothorax. I consider the structural differences of the head, thorax and wings important, and was indeed induced only by them to separate the two species. The difference of the spots on the wings is less important, the more so as I have noted, Stett. Ent. Z., xix., p. 124, a specimen of *A. occitanica* from Russia with similar spotted wings as in *Americana*.

4. All wings are sharper pointed, the hind wings are narrower, and the apex more falcate. The wings are less spotted ; the space between fourth and fifth vein is without spots, the space between subcosta and radius nearly spotless ; the hind wings less spotted.

5. The color of the body below is yellow, the legs nearly yellow ; the abdomen above yellow with a longitudinal brown band, divided in the median line ; on each side a lateral dark band ; the segments 5 to 7 with a small yellow dot on each side nearer to the base. The appendages of the male are short, 3 m.m. long, cylindrical, straight, rounded on tip, with black hairs.

4. *Acanthaclisis fallax* Rbr.

I am not able to give now an exact and sure opinion of this species, as my 12 specimens were destroyed in bringing over my collection. Of these, seven males were from Brazil and Guiana (*M. senilis* Klug, still present in the Berlin Museum), and from California. I had provisionally separated five of these from Cuba and Venezuela (not described) as *M. Cubana, mihi.* But I have described them all later as *A. fallax* Rbr. (type compared). and *A. impostor* Walk. (type compared) in my Synopsis of Neuropt. of N. America, p. 223, No. 2. Only two specimens in very

bad condition are now before me, from Mungruba, Ceara, N. E. Brazil, and from the Isthmus of Tehuantepec, Mex., coll. by Prof. Suamichrast. A figure, which has been overlooked, is given (1742) in Reaumur, Mem., vol. 6, pl. 34, f. 15, and only mentioned, p. 386, as received from Hayti by Mr. DuHamel. The figure, a male, is bad, but represents very probably the same species.

The wings of *A. fallax* are much paler, less spotted, or not at all. Otherwise, if my memory is right, they agree with *A. Texana*, at least some small differences in Rambur's and Walker's descriptions seem to be not important. If so, *A. Texana* would be only a northern, stronger colored form of *A. fallax*.

Though I have tried to separate carefully *A. Americana* from *A. Texana*, the assumption that the first species may represent only a more northern and strongly marked form of the latter one is very inviting. Nevertheless I have before me the raised larva of *A. Americana* from Florida, and the supposed larva of *A. fallax* from Victoria, Brazil. Both seem to me different, and until now no other Brazilian species is known.

5. *Previous Stages of Acanthaclisis Americana.*

Larva full grown Head oblong, broad, the base covered by the prothorax; a little longer than broad, above flattened, below slightly convex; sides a little curvate, so that the base is narrowed; front margin notched; labrum nearly as broad as the head, on each side covering as a narrow lobe the base of mandibles; front margin with black bristles; eye-cone with six ocelli, and a seventh below the others among black bristles; antennæ short, thin, with annulated joints, and a longer, cylindrical apical one; mandibles as long as the head, black, powerful; basal half dilated with three oblique strong teeth, separated, the basal one a little shorter; apical half curvated, pointed; no interior bristles; head above with short hairs, directed to the front, on sides and below more numerous; labial palpi short, two cylindrical small basal joints; apical as long as both together, thicker, above triangularly dilated.

Prothorax a little broader than head, above globose; hind segment short with two stigmata; the other parts ovoid, half as broad as long; mesothorax broadest; scars as commonly; first abdominal segment with a dorsal stigma, the following ones lateral; the segments with short black lateral brushes; abdomen above with black hairs on the transversal folds; last segment round, transversally split with numerous black thorns and

hairs. Legs moderately long and thick, the claws a little incurvate on tip; hind legs shorter; claws short, strong, pyramidal. Color yellowish gray; head above with two black bands, enlarged before, and on each side an incurved black line, touching the front corner of the band and going behind to the lateral margin; before the bands two angular spots; lateral margin dark; head below blackish brown on the middle of front margin, and on the sides below the eye-cones yellowish; on each side of the base brownish, less dark; prothorax with two blackish longitudinal bands, broader anteriorly; basal segment with two angular spots; abdomen above gray, checkered with black; two black bands on each side are interrupted to form square black spots; below the abdomen is more yellowish at base, with angular black spots between the legs, which are pale yellow.

Long., 23 m.m.; lat., 10 m.m.

Comparing this larva with those supposed to belong to *A. fallax* (Stett Ent. Z., 1873, p. 266), there can be no doubt that they belong to different species. Those of *A. fallax* are longer, more slender, the head narrower, longer, the lateral margins of abdomen with long black brushes, the teeth of mandibles different, and the part of the mandible in which they are inserted more inflated; besides the colors are different.

The larva of *A. Americana* is in shape, form and color more like that of *A. occitanica*, but the teeth of the latter are more like those of *fallax*.

The shed larva skin of *Americana*, 12 m.m. long, is before me; also the cocoon, 20 m.m in diameter, externally covered with sand.

A nymph just hatched, 26 m.m. long, is still partly in the skin; the mandibles are just as broad and just as serrated as Brauer figures them for *A. occitanica*. In fact all stages are so similar that it is difficult to believe them to belong to different genera.

Habitat.—Mr. H. G. Hubbard, to whom I am indebted for this valuable discovery, writes as follows: "The *Acanthaclisis Americana* I bred from the larva. One died in quitting the cocoon. I never saw the imago until I bred it, so it must be very rare in Florida. The larvæ I found in dry sand under a building in Crescent City, Florida. They do not make pits, but they prey upon the common pit-fall making Myrmeleon larvæ. These they chase under the sand, as fish pursue their prey under water. I found that in confinement they would not eat anything which remained on top of the sand, nor which I purposely buried for them. But they

captured and ate as many larvæ of Myrmeleon as I had time to procure for them."

6. *Larva.*

Together with the two larvæ of *A. Americana*, Mr. Hubbard sent a very similar but a little smaller one from the same locality.

The larva is of much brighter colors, long. 17 m.m., broad 7 m.m., and is similar to *A. Americana*, but with only one tooth on the mandibles. This is so entirely exceptional for Myrmeleon and Ascalaphus (only *Suphalasca Dietrichiæ*, Brauer, is known with one tooth), that at first I supposed it to be a deformity. Nevertheless both mandibles are entirely alike, and no trace of any deformity is to be seen. The mandibles are reddish-brown, shorter than in *Americana*, and less incurved; internally after the third basal part a strong, oblique, conical tooth, much longer and larger than the basal tooth of *A. Americana;* there are no bristles, but the inner margin of the mandible goes behind the tooth, sloping to the tip. The eye-cone is lower; antennæ with three basal joints longer, conical, followed by a few annulate short joints, the apical one larger ovoid. Head smaller; otherwise the whole larva, colors excepted, is entirely similar to *A. Americana.* The color is light yellow with a grayish tinge on thorax and abdomen; two black dots near the front of the head; prothorax on each side of the front margin with a transversal black band, notched behind; two large spots near the hind margin; mesothorax and metathorax on each side with a round black spot, divided by a yellow line; abdomen above with two black interrupted bands, formed by a square spot on each segment; a strong black brush directed anteriorly on the side margin of segments; the under side and legs are uniformly yellow; head with a black anterior margin; last segment as in *Americana.*

I can not say more about this curious larva. Mr. Hubbard writes me that it was collected in the same place with the others, but that he had not remarked the difference of the mandibles. Perhaps he will be able to solve the mystery.

7. *Acanthaclisis occitanica*, Vill.

The life history of this species is very well described by Professor Brauer; all stages are before me. It was known long ago that among the species of Acanthaclisis in America, Africa, Asia and perhaps Australia, a certain number have not the spurs broken in a right angle suddenly, and the basal part dilated as in the type. Rambur is supposed to

have chosen the name of the genus for this character, though I am not aware that he ever had mentioned it; the derivation is given in Agassiz Nomenclator. The other species have the spurs subuliform, more or less incurvated. This character is indeed very obvious, and so it has been several times stated that probably the species with subuliform spurs could form a different genus. Mr. Redtenbacher, 1884, remarks that I had not stated whether the larva of *A. fallax* had bristles between the teeth of the mandibles or not. Now *A. fallax* has no bristles, and therefore they were not mentioned by me. But I was not then aware of the importance of this character, otherwise I should have mentioned their absence. The splendid figures of all my larvæ drawn by Mr. Konopicki, Vienna, I have not yet been able to publish.

The question whether *Acanthaclisis* has to be divided or not, was studied by me carefully. The previous stages of *Americana*, the first species known with unbroken spurs, except for the entire absence of bristles between the teeth of the mandibles, seem not to favor a division. I am until now not able to find differences in the characters, except the negative one in the larva, and the positive one in the imago. But I think in *Chrysopa* and its allied forms similar differences exist. The third N. American species, my *A. congener*, has broken spurs similar to those of *occitanica*, and my presumed larva (Mr. Redtenbacher supposes it to belong to *Macronemurus*) has bristles on the inner margin of the mandibles.

Mr. McLachlan, Ent. M. Mag., vol. xx., p. 183, says of *A. occitanica*: "Introduced in Prussia." If his statement is not based on new facts or observations unknown to me, I believe that a perusal of the statements given in Stett. Ent. Zeit., vol. xix., p. 124, and vol. xx., p. 431, will not warrant us to consider the species as introduced in Prussia. It is true that the species found through seven years in Kahlberg, Prussia, is not recorded for the whole region between Prussia and Hungary, or beyond the Alps. But I may remark that *A. Americana* is not recorded for the larger distance from Sandy Hook, New York, to the south of N. Carolina. It is believed that a number of insects of the southern species, even of Florida, are to be found in S. Massachusetts, Martha's Vineyard, Nantucket, as a consequence of the warmer temperature of the Gulf Stream; I am assured of the same fact for Sandy Hook. There is perhaps another explanation of the fact that *A. Americana* has not been yet discovered between New York and N. Carolina. Those large *Acanthaclisis* belong to the most sluggish insects known. For the European species I can

speak from my own experience, which is fully corroborated for the American species by two entomologists here. In Kahlberg, Mr. Schindofsky came to show me the insect in the field, and told me he was sure I would pass by it without seeing it. On a rustic fence I really passed it; the specimen had been sitting on the same place at least for two hours, and matched perfectly with the color of the bark of the fence rail. I threw it in the air to see it fly. It fluttered in the most lazy and awkward manner, until it tumbled in a potato field very near; when I took it up again, without any resistance on its part, the same show was experienced. Perhaps they are more agile during the night. The not uncommon presence of the insect in the same place was observed during the last seven years before I left Europe. As later, by order of the Government, a country road was laid just through the sandy hill where the insect lived, it may have been destroyed, but I have had no information about it. As I have been connected most intimately since the first discovery of this species in Prussia, with the question, "introduced or not," I beg leave to give my objections to the statement that it is introduced, which seems to be an impossibility.

The following interesting species of an Ascalaphide, described by me many years ago, but not yet published, has the same distribution as *Acanthaclisis Americana*, going even further to the north.

8. *Colobopterus excisus* Hagen.

Male. Eyes globose, very large, separated above by a narrow, hollowed, dark brown furrow; front dark brown, along the inner border of the eyes pale; near the antennæ with long grayish hairs; each side above the labrum with dense whitish hairs; labrum yellowish; palpi shining, blackish-brown, joints paler on tip, which has black hairs around, except the apical joint; labium yellow. Eyes blackish-brown behind; antennæ a little shorter than front wings, blackish, base with grayish hairs, club large, ovoid, the joints above and below with white transversal lines. Thorax dark brown with two yellow spots and brown villosity above; besides gray hairs. Abdomen a little longer than the wings, basal half a little enlarged; black, segments 2nd to 4th with a long black velvety band on each side of the apical half; surrounded by yellow, which covers the basal half, and is separated only narrowly in the middle; segment 2 with a dorsal brush of erected black hairs in the middle, where the velvety bands begin; the three last segments yellowish on tip; last segment covering two oblique appendages, the tip somewhat inflated, yellowish; those

parts are not well visible. Legs short, black, very hairy; spurs as long as four tarsal joints. Wings hyaline, veins brown; extreme base of all brownish; pterostigma yellowish; hind wings on the basal third of the hind margin with a deep semi-circular excision, reaching the longitudinal veins; front wings with a very flat notch on the base.

Long. of body 34 to 38 m.m.; long. of abdomen 25 to 31 m.m.; long. antennae 26 m.m.; exp. al. 64 m.m. Lat. of hind wings, 7 m.m.; on the notch, 3 m.m.

Hab.—A male from Florida, by Uhler; a male from Cumberland Gap, Ky.; a male from New Haven, Conn., by E. Harrison; a male from Falmouth, Mass., July 22; a male from Middleboro, Mass.; besides I have seen some fresh specimens collected by B. P. Mann in June, in Martha's Vineyard. The distribution from Florida to Martha's Vineyard Isl. is very large. This species is until now the only one known from the U. S.

I have before me a sketch of a young larva of an Ascalaphide, made more than a dozen years ago, which was shown to me by Mr. Riley; perhaps it belongs to this species, at least it differs from all larvae known.

9. *Acanthaclisis congener* Hag.

Synops. N. Am. Neuroptera, p. 224, No. 3.

Black with gray villosity; face, palpi and base of the antennæ beneath yellowish white; antennæ short, stout, black, faintly annulated with yellow, more visible on the apex; maxillary palpi yellow, slender, cylindrical; labial palpi longer, stronger yellow, last joint with short black hairs, inflated before the sudden coarctated pyramidal tip; on the inflation an external impressed longitudinal narrow band; vertex black with two anterior transversal bands, the posterior one incomplete, interrupted in the middle, and two dots posterior to the bands, all yellow; prothorax quadrangular, a little broader near the thorax, front margin about straight; black, with some whitish villosity; some tufts of black hairs on each side; a maculose stripe on each side and two middle spots yellow; posterior margin fulvous, black in the middle; mesothorax black, covered with whitish villosity; two spots on the front margin, then six in a series, the intermediate ones triangular, and two posterior, all yellow; some not well defined below the wings. Abdomen black with gray pile, more dense at the base; posterior margin of segments pale yellowish; segments 5 and 6 of males with a large triangular apical spot, which is bifid on the 5th segment; last segment short, black; male appendages very hairy, light

brown, twice as long as last segment, basal half thicker, with a knee below, apical half cylindrical, rounded on tip, with a brush of black hairs below; seen from besides the basal half is triangular, going downward, the apical half straight horizontal. Abdomen of female a little shorter and thicker; last segment below with black hairs, and split in the middle; on each side with a yellow cylindrical appendage as long as segments; legs short, hairy, fuscous; tibiæ yellowish, annulated with black, or sometimes black annulated with yellow; spurs brown, dilated, the tip broken down suddenly in a right angle; tarsi black, apical joint yellow; claws brown, incurved. Wings hyaline, a little acuminate, veins and veinlets alternately yellow and black; pterostigma small, indistinct, blackish; costal space with one series of areoles; hind wings a little shorter, veins not so much spotted; the males at base with a small yellowish pelote.

Long. of body, 36 to 38 m.m.; exp. alar., 70 to 80 m.m.

Hab.—The types (now destroyed) were four females from Pecos River, Western Texas (now N. Mexico), collected in July on Capt. Pope's Expedition; one specimen of the same lot is still present in Mr. Uhler's coll. I have now before me a dozen specimens, half females, one from Oregon by Mr. H. Edwards, and all others from Ainsworth, Wash. Terr., July 20, coll. by Mr. S. Henshaw. Ainsworth, a town, then only a few months old, is situated in the middle of a sandy desert just near the Columbia River and mouth of Snake River. The little inn where we had to stay showed the windows and window-sills covered with Myrmeleons, all of a very sluggish temper. *A. congener* was common. One male was collected the day before, July 19, on the Big Bend of the Yakima River.

About the supposed larva of this species described by me long ago, I have to speak later.

The species of *Acanthaclisis* described here are the only ones known to exist in N. America.

10. *Myrmeleon gulo* Burm.

The type of Burmeister, vol. ii., p. 997, No. 18, from Senegambia, in Winthem's collection, has been carefully compared by me. Burmeister quotes *M. gulo* Dalman, Analecta., p. 89, No. 101, but neither the label nor the description give any surety that the specimen had been sent by Dalman as his type, the more so as this is stated for the following species in Burm. Handb., *M. Hyaena*. The type of the latter is now with

Schoenherr's collection in the Stockholm Museum. Indeed the identity of Burmeister's *M. gulo* with this of Dalman is rather doubtful, as the following characters of Dalman's description are wanting in Burmeister's specimen :

1. *Niger*—alis *fuscescentibus—nigro strigosis.*
2. Collare—*nigropilosum.*
3. Thorax supra—*immaculatus.*
4. Pedes—*immaculati.*
5. Alar. confertim *reticulatæ;* stigmata *fusco;* punctum *fuscum* medium ante apicem.

As Burmeister's *M. gulo* is apparently *Acanthaclisis distincta* Rbr., we may retain this name.

11. *Myrmeleon nigrum* Linn.

Among Linnæus's papers were found the descriptions of some species which were published by Afzelius in Linnæus's autograph annotations, p. 138, No. 14. The same was re-published, 1832, by Fee, in the Life of Linn , Mém. Soc. Sc. Lille, p. 365 :

Myrmeleon nigrum.—Alis medio fascia posticeque maculis albis. Hab., Africa, Fothergill. Corpus Myrm. formicarii sed alae latiores, et totum nigrum. Antennæ setaceæ. Alae nigræ concolores ; fascia alba lineari interrupta in medio, sed postice maculis albis plurimis majoribus magis sparsis.

I am not aware that the species is mentioned by later entomologists. I do not know where it belongs.

THE CLASSIFICATION OF THE BOMBYCIDÆ.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Notwithstanding much that has been learnedly written upon the family BOMBYCIDÆ, or Spinner Moths, no strong exclusive structural characters have been brought to light which hold the groups together as a natural family. Following Linné and Latreille, the American authors, Dr. Harris and Dr. Packard, have, however, considered such a family to exist. In Germany the different groups, or sub-families, have been raised to the rank of families, while under the loose term Bombyces the Spinner Moths as a whole have been designated. In this paper the

American tradition is followed, and the nomenclature adapted to this classificatory view. The *Bombycidæ* are characterized as a whole by their ample wings and sluggish habit. The head is small and the oval structure generally weak and undeveloped. The antennæ are short, rather than long, and oftenest pectinated in the male sex. The pieces of which the thorax is composed present a somewhat different proportion, as compared with other families of moths, and the thorax appears shorter and also more elevated dorsally. The legs are weak; the abdomen cylindrical, untufted as a rule, and not exceeding the hind wings. The habit of cocoon-making is carried to its greatest development in certain groups, but the American sub-family *Ceratocampinæ* makes no cocoon, the pupa lying naked in the ground. The strong characters which mark certain sub-families, such as the *Hepialinæ*, in the neuration and thoracic structure, at first sight seem of family rank, but the general *form*, which must decide the question, according to Agassiz, enables us to consider all these groups as interrelated and as the survivors of a former complex in which there were fewer gaps. The arrangement of these groups in a linear series must proceed according to our ideas of rank, and in this case it cannot be doubted that the *Hepialinæ* are the lowest. The classification of Harris is thus apparently more philosophic than that of v. Hainemann and Speyer.

I have only differed from Dr. Packard in eliminating the *Hemileucinæ*, and in separating the *Cossinæ* and *Hepialinæ;* further, I have placed the genus *Crocata* among the *Arctiinæ;* I have also rejected Packard's genus *Platycerura* as not allied to *Cerura*, but as probably an Apateloid form. If we do not include this genus among the higher Owlet Moths, it must find a place beside *Dasychira*. The moth itself was one of my own earliest discoveries. I kept back from describing it on hearing that it was to be published in the well-known Synopsis of the family which shortly after appeared in the Proceedings of the Entomological Society of Philadelphia.

The different sub-families of the *Bombycidæ* show resemblances to other families of moths: The *Arctiinæ* are with difficulty to be separated from the lower *Zygænidæ;* the *Psychiinæ* run close to certain *Tineidæ;* the *Notodontinæ* resemble the *Noctuidæ;* the *Ceratocampinæ* the *Sphingidæ;* the *Cochliopodinæ* the *Tortricidæ;* the *Platypteryginæ* the *Geometridæ*. The *Cossinæ* and *Hepialinæ* are internal feeders in the larval state, and thus resemble the *Ægeriidæ*. Dr. Packard has most inter-

estingly shown that the *Neuroptera* afford a synthetic type among the orders of insects, and also how the *Hepialinæ* are related to this order by their long thorax, the sub-equal wings, the unusual number of veins, their distance at base, being nearly set on a plane, as the wings of dragon-flies. So, among the moths themselves, the Spinners occupy a central and synthethic position, having resemblances to all the other moths, and probably containing very old types of *Lepidoptera*.

The caterpillars are usually hairy or provided with warts and bristles, but not a few are naked and sphingiform, as that of *Notodonta stragula*. Probably one of the most remarkable known lepidopterous larvæ, that of the European *Stauropus fagi*, occurs in this family. This brown caterpillar is called "the lobster" by collectors from its odd shape; the thoracic feet are abnormally developed. The moth is not unlike our genus *Heterocampa* and is sufficiently commonplace. Walker mistakenly credits North America with species of this genus.

The sub-family *Nycteolinæ*, of which *Nola* is the type, and which is characterized by the weak bushy palpi, while the white and grey moths look like minute *Noctuidæ (Eustrotia)*, is represented in North America by the genera *Nola*, *Argyrophyes* and *Sarothripus*. The palpi exceed the head, and are somewhat flattened. The second sub-family, or *Lithosiinæ*, is characterized by the absence of simple eyes, or ocelli, and narrow wings, while most of the genera are, like the Bryophilians, lichen feeding The genus *Crocota* is wrongly included here by Dr. Packard. Prof. Saunders describes the larva of *C. quinaria* under the name of *Arctia bimacula*, and it is quite clear that this frail genus is to be classed under the sub-family *Arctiinæ*.

In the present brief paper I only direct attention to the position of the sub-family *Hemileucinæ*. In this sub-family, which I separated from the *Attacinæ* (=Saturnidæ of Authors), the mature larva is provided with short bristles arising in fascicles, and thus in the mature larval stage resembles the young larva of the *Attacinæ* on leaving the egg, such as that of *Platysamia cecropia*. The cocoon is not free and spun in the leaves and branches, but on the ground, amid *debris* and mixed with sand and soil. The perfect insect has the antennæ less lengthily pectinate, as compared with the *Attacinæ*, and the broad wings are no longer falcate. We have to do with a type intermediate between the *Attacinæ* and *Ceratocampinæ*. The genera are *Pseudohazis*, *Hemileuca*, *Argyrauges*, *Coloradia* and *Hyperchiria*. *Hemileuca* contains species so closely

allied that it is evident we have to do with one of the kind I have called *Progenera*, of which *Datana* is so conspicuous an example. The moth *H. tricolor* Grote, ex Pack., is, however, a true *Hemileuca*. The characters of this genus, the black antennæ, the red body tufts, are retained in this faded moth, which has been cited by Dr. Packard as owing its color to its peculiar environment. The genus and species *Argyrauges Neumoegeni* Grote, ex Hy. Edwards, is closely allied, but here the antennæ are yellowish and comparative differences allow us to concede a new generic type. The relationship is evidenced by the red tufts still, but the pattern, not the color, has also undergone a modification. It is quite clear that the genus *Euleucophæus* has been misapplied by Henry Edwards and Mr. Neumoegen. I have not seen the insects described by these writers, but they must be referred to a different genus, since *Euleucophæus*, with its type *tricolor*, has no standing. They may be allied to *Coloradia*.

The sub-family *Ceratocampinæ* is first eliminated by Dr. Harris. It appears to me to be exclusively North American, and even to be confined to the wider region east of the Rocky Mountains, the Sierras and Cordilleras and Andes of America, the rocky back bone of the whole continent. Among our *Attacinae*, the two species of *Saturnia* are most interesting, both because they belong to this European genus, and because they illustrate what I have pointed out among the lower moths, a certain affinity between the faunas of Texas and California, not apparent in the Lepidoptera of the Middle States.

SOME EUROPEAN BEETLES IN AMERICA.

BY SAMUEL HENSHAW, BOSTON, MASS.

On page 114 of the present volume of the CANADIAN ENTOMOLOGIST Mr. A. R. Grote in his "Note on Mistaken Identifications," mentions Dr. Harris's record of the capture of *Carabus auratus* Linn., in Massachusetts, and implies that Dr. Harris has made an erroneous, or "curious," identification. This, however, is not the case, and it would be impossible for so careful an observer as Dr. Harris to make a mistake about a species so well known.

The specimen referred to is preserved in the Harris collection, and, so far as I know, is the only one on record captured in the United States.

In the catalogue of the Harris collection we read : " 2. *Carabus auratus* L. In Dr. Holbrook's garden, 1819. Undoubtedly introduced in balls of earth surrounding the roots of French trees."

Dr. Leconte (Ann. Lyc. 1848, vol. iv., p. 159–160,) also mentions this occurrence of *C. auratus* in the United States, and assigns the same method of dispersion. This record of *C. auratus* recalls the case of another common European beetle found once in Eastern Massachusetts, but which has failed to become established. In the Proc. Bost. Soc. Nat. Hist., 1869, vol. xii., p. 381, Mr. Ernest Papendiek notes the capture in Milton, Mass., of twenty specimens of *Silpha atrata*.

In 1844, Dr. F. E. Melsheimer described as new *Onthophagus rhinoceros* and *Aphodius pensvallensis;* subsequent study, however, proved *O. rhinoceros* synonymous with *O. nuchicornis*, and *A. pensvallensis* the same as *A. erraticus*, both well known European species. Drs. Haldeman and Leconte in a foot note to the Melsheimer catalogue doubted the occurrence of both species " unless introduced by accident," and it is only quite recently that we have been able to add both species to our lists. Mr. Otto Lugger reports *A. erraticus* as abundant in Maryland, and in June, 1881, when collecting on several of the Magdalen Islands in the Gulf of St. Lawrence, I found *O. nuchicornis* abundant in cattle droppings. As I have since seen specimens from New Brunswick and Rhode Island, the species is probably established in this country.

On some future occasion it will be interesting to note the species erroneously accredited to the fauna of North America, together with those common to America and the eastern hemisphere.

Report of the Select Standing Committee on Immigration and Colonization of the House of Commons, Ottawa, 1886.

In this " Blue Book " we find some valuable information on injurious insects given to the Committee by our friend Mr. James Fletcher, who is doing much good work in Economic Entomology in connection with the Dominion Department of Agriculture. It must be evident to the Department, we should think, by this time that Mr. Fletcher's services are of so much value to the country that they should be no longer of a purely " honorary " character, but should be regarded in the same light as those of Prof. Riley at Washington, Dr. Lintner at Albany, Prof. Forbes in Illinois, and many others in various States of the Union.

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SOME NORTH AMERICAN TACHINÆ.

BY BARON OSTEN SACKEN.

[The following paper was left by Baron Osten Sacken [O. S. had left Washington on Embassy about ten years earlier], with his collection of Diptera, in the charge of Dr. H. A. Hagen, of the Museum of Comparative Zoology, Cambridge, Mass., by whom it has been sent to us for publication. The description of the last species, *Tachina theclarum*, is by S. H. Scudder.—ED. C. E.]

Tachina (Exorista) futilis Say., MSS. ♂, ♀. Palpi, antennæ and legs black; face, front and last abdominal segment with a brassy-yellow reflection. Length, 7–10 m.m.

Bottom of the antennal foveæ silvery gray; the lower part of the cheeks likewise; front, lateral parts of the face and the orbit of the eyes below and behind (genal and occipital orbit) brassy-yellowish, the coloring of the front being of a more saturate yellow than the lateral parts of the face; above the antennæ, in the middle of the front, a brown stripe, attenuated posteriorly; it bifurcates on the vertex, enclosing the grayish ocellar triangle; the hind plane of the head (occiput) gray. The row of frontal bristles consists: 1st, of three bristles pointing backwards, the uppermost of which is placed on the top of the vertex; 2nd, of three shorter bristles pointing forward; 3rd, of four or five bristles which form diverging rows, descending on both sides of the antennæ, the last being a little below the end of the second antennal joint. Between the frontal bristles and the eyes, the front bears numerous little hairs; between these rows on the ocellar triangle is the usual pair of bristles pointing forwards. The females have three supernumerary pairs of larger bristles; the first is placed behind the upper corner of the eye, the two others between the frontal row and the orbit of the eye. Among the above described smaller hairs, immediately below the last bristle, the brassy-yellow color of the face shows a brown, changing spot, visible in an oblique light only; below this place, the lateral parts of the face are smooth; a short distance above the oral margin there is, on each side, the usual long bristle; above it, some shorter hairs reach to about one-quarter of the

distance between the long bristle and the root of the antennæ. Antennæ black; second joint with a grayish pollen, and with a crest of short, stiff bristles; third joint long, with parallel sides, more than three times the length of the second, not quite reaching the edge of the mouth. Eyes distinctly pubescent.

Ground color of the thorax bluish black, almost concealed by five stripes of gray pollen, with intermediate black lines; the gray stripes are especially apparent when viewed obliquely from the posterior end of the body; in this light the median stripe appears bifurcate posteriorly; the next pair abbreviated posteriorly; the lateral pair very broad anteriorly, over the humeri. Scutellum bluish-black, with gray pollinose reflections; its tip faintly brownish; on the hind edge there are six bristles, the intermediate pair being the shortest; above this pair, on the plane of the scutellum, another similar pair. Pleuræ, grayish pollinose.

Abdomen black, marmorate with silvery gray; the fourth segment brassy-yellow. The whole abdomen is covered with dense short hairs; a pair of longer bristles near the hind margin of the first and second segments; a row of such bristles on the hind margin of the third segment, and a double row at the end of the fourth. Legs black; pulvilli brown; knees slightly brownish.

Wings: the first posterior cell open (closed by the prolongation of the costal vein, however, which nearly reaches the apex of the wing); the distance between the tips of the second and third veins is a little longer than that between the third vein and the apex of the wing; the elbow of the fourth vein without stump of a vein (a very minute one in one of the specimens); the great cross vein oblique, parallel to the last section of the fourth vein; small cross vein (in most specimens) opposite to about the middle of the distance between the tips of the auxiliary and first veins.

Bred from *Vanessa atalanta* (T. W. Harris and S. H. Scudder). Numerous specimens.

Tachina (Exorista) blanda, n. sp. ♂. Gray, thorax with four black stripes, the lateral ones broken in the middle; palpi and legs reddish; second and third abdominal segments with an additional pair of macrochetæ in the middle. Length 7 m.m.

Distribution of the frontal bristles as in *E. futilis* ♂, that is, on each side, beginning with the vertex, three longer bristles pointing backwards, three

shorter bristles before the antennæ, and three or four bristles descending on the face, alongside of the antennæ. On the ocellar triangle, a pair of bristles pointing forward. Between the row of frontal bristles and the eyes, a few scattered microscopic hairs; sides of the face bare. Front, face and posterior orbit silvery white. Frontal stripe brown, rather narrow, enclosing posteriorly the grayish ocellar triangle. Antennæ black slightly tinged with brownish red on the two first segments; the third segment is very long, almost reaching the edge of the mouth. Only a few short bristles above the usual long oral bristle. Palpi, reddish yellow. Eyes pubescent.

Thorax gray, with a slight yellowish tinge from an oblique point of view; two slightly divergent black lines do not reach beyond the middle; two lateral black stripes are interrupted at the suture and prolonged beyond it to the hind border; these lateral stripes are broadest in the middle and end in a point, anteriorly and posteriorly. Scutellum gray; two pairs of large macrochetæ each side; a third intermediate, very small pair, on the apex.

Abdomen gray with, a slightly yellowish tinge, especially on the last segment; somewhat marmorate, with blackish crossbands on the hind margins of the segments, and a longitudinal blackish line; the crossbands appear more distinct and broader from an oblique point of view; the longitudinal line disappears when viewed sideways from above. A pair of macrochetæ on the hind margin of the first segment; two pairs on the second segment, one in the middle, the other on the hind margin; on the third segment, a pair in the middle, and the usual row on the hind margin; two rows on the fourth segment.

Legs: coxæ and femora reddish; tibiæ reddish-brown; tarsi brown. Pulvilli unusually large; ungues?

(The wings in the described specimen are injured.)

A single specimen, bred from *Cynthia cardui* (C. V. Riley.)

This species is like *E. futilis* in the distribution of the bristles on the front and in the structure of the antennæ. It differs in the presence of an additional pair of macrochetæ in the middle of the second and of the third abdominal segments; also in the comparative smallness of the intermediate pair of macrochetæ on the apex of the scutellum.

Tachina (Exorista) hirsuta n. sp. ♀. Palpi, antennæ and legs black. Length 7 m.m.

Distribution of the frontal bristles like that in *E. futilis* ♀; that is,

besides the usual row of bristles on the front, there is a second row of three bristles on each side, between the first row and the orbit of the eye; the upper bristle of this second row is placed near the upper corner of the eye, alongside of the upper bristle of the first row; the second and third bristles are inserted lower down on the front. The usual inner row of frontal bristles consists of three bristles on the vertex, pointing backwards, the upper one of which is the longest, and of six bristles below them, descending rather low on the face, considerably below the end of the second antennal joint. The pair of bristles on the ocellar triangle is present. Above the usual long bristle on each side of the oral border there is a row of small hairs, ascending along the ridge of the face, but not reaching the level of the lowest bristle of the frontal row. Antennæ black, third joint with parallel sides, broader than in *E. futilis* and *E. blanda*, but at the same time shorter, as it does not reach the oral border. First half of the arista remarkably stout; its basal joint long and distinct. Palpi dark brown or black. Face and front silvery; oral margin pale; frontal stripe brown; ocellar triangle blackish, grayish pollinose. Eyes pubescent. Thorax bluish-black, grayish-pollinose; two sub-parallel, soon interrupted, black stripes in the middle, and two less definite lateral stripes, black. Pleuræ black, with a light-grayish pollen. Scutellum black, grayish-pollinose, its hind margin yellowish; the two lateral pairs of macrochetæ rather long and strong; the intermediate one small; a pair of small macrochetæ on the disc. Abdomen black, marmorate, with grayish-silvery reflections, especially on the anterior borders of the segments; a pair of macrochetæ on the hind border of the first segment (I believe that I perceive them in my only specimen, although its abdomen is so much crowded against the scutellum that this character is not easily discernible); on the second segment, a pair of macrochetæ in the middle only; on the third, the usual row of macrochetæ along the hind border; on the fourth, a number of macrochetæ, giving it a bristly appearance; the smaller hairs of the abdomen are more erect, longer and bristle-like than in *E. futilis* or *E. blanda*. Feet black. Wings nearly as in *E. futilis*.

Bred from *Pieris rapæ* in April (Lintner).

Tachina deilephilæ, Riley MSS. ♀. Palpi yellowish; antennæ and legs black; face and front silvery; abdomen red on the sides; venter red. Length 7 m. m.

Face and front silvery, the latter with a blackish-brown stripe; ocellar

triangle enclosed in the bifurcation of this stripe; the remaining portion of the vertex blackish; the rows of frontal bristles, on both sides of the frontal stripe, are short and inconspicuous superiorly, and only of moderate length near the antennæ. Of the three uppermost pairs of long bristles pointing backwards, which exist on the vertex in *E. futilis*, only the upper one is present; the lowest bristle of the rows is nearly opposite the end of the second antennal joint; there are but a few very inconspicuous hairs on the lower part of the front, between these rows and the orbit; nearer to the vertex, these hairs become more dense; a bristle above the upper corner of the eye (corresponding to a similar bristle in *E. futilis* ♀,) is present; the pair of bristles pointing forward on the ocellar triangle is also extant. Below the bristles the face is smooth, with but a few almost microscopic hairs; a short distance from the oral margin, there is on each side, the usual long bristle, above it some shorter hairs do not reach very high on the face. Antennæ black somewhat reddish on the incisure between the second and third joints; third joint with parallel sides, much shorter than the corresponding joint of *E. futilis* and not reaching the edge of the mouth by about one half of its own length. Eyes distinctly pubescent; palpi yellowish.

Thorax black, with the usual five stripes of gray pollen on the dorsum; scutellum with a brownish tinge, grayish-pollinose; bristles placed as in *E. futilis*. Abdomen blackish in the middle, reddish on the sides and at the tip; the red on the second and third segments occupying as much of the breadth of the dorsum as the black; the fourth segment is red, with elongated blackish spot in the middle of its base; all the segments with silvery-gray reflections. A row of bristles along the posterior margin of the third and on the fourth segments; the pairs of longer bristles on the first and second segments, which exist in *E. futilis*, are wanting here. Venter red, densly clothed with black hairs. Venation of the wings as in *E. futilis;* but the costal vein is not prolonged beyond the tip of the fourth vein; the great cross vein is distinctly bisinuate.

Bred from *Deilephila lineata* (C. V. Riley).

Three specimens.

The presence of only a single pair of long bristles on the top of the vertex, pointing backwards, and the absence of the pairs of macrochetæ on the first and second abdominal segments, prove that this species belongs, if not to a different genus, at least to a different section of a genus than *E. futilis*.

Tachina theclarum, parasitic on No. 30 *(Thecla inorata)*. Mr. W. Saunders. From life. Length 5 m.m.

Back of head steel gray, covered with short blackish hairs; front pale or whitish slate color, with darker reflections and with a vertical broad, blackish, frontal band; on either side a slightly curving row, outwardly concave, of black, curving, tapering bristles, directed upward, extending down the front from the summit to below the base of the antennæ; outside of the middle of this row a pair of similar downward directed bristles; a pair of downward directed bristles near the middle of the summit. Antennæ dark slate color. Eyes rich brown, covered with exceedingly delicate, short, white pile.

Thorax above dark brown with a hoary bloom, covered by frequent, erect, short, black hairs, and infrequent, decumbent, backward directed, large, black, tapering bristles; metanotum edged broadly behind with reddish brown; thorax and abdomen beneath piceous; covered profusely with long black hairs. Abdomen above shining piceous, first joint immaculate, second and third, especially latter, silvery or nacreous at base, obscure in the middle, fading out posteriorly; fourth segment nacreous at extreme base only; all profusely covered with long black hairs; second segment with a pair of erect, slightly curving, very long and tapering subdorsal bristles at the posterior border; third segment bristling with a transverse row of similar bristles, a dozen or more in number.

Legs black; claws black; pulvilli pale or colorless; tongue testaceous; covered profusely at tip with rather long colorless hairs; labial palpi blackish-brown.

SOME NOTES ON THE GENUS COLIAS WHILST ALIVE IN THE IMAGO STATE.

(Being extracts from a paper read before the Entomological Society of Ontario, Oct. 20th, 1886.)

BY GAMBLE GEDDES, TORONTO.

The paper which I have prepared to read upon the genus *Colias* differs from any that I have consulted up to the present time, in that it treats principally of the habits of the different species during lifetime in the imago state.

During the last ten years gigantic strides have been made by lepidop-

terologists in breeding the different species of this perplexing family, and their efforts have been crowned with such success that only a few remain about which nothing is known of the primary stages. It is about the life habits in the perfect state of some of these that I propose to address you, and if my paper does no good, it certainly cannot do any harm, as you will see by the subjoined list of my captures of the different species of Coliadæ that I have a right to express an opinion in this particular direction. Every entomologist knows that the only true way of ascertaining *bona fide* species in any family of diurnals is by breeeding from the egg and noting the different stages of metamorphoses, and although so much has been accomplished in this genus *Colias* by enthusiastic collectors, yet a great deal remains, and where we have not the means at hand to watch the progress of an insect from its earliest stage, we must content ourselves with the appearance first, and next, the habits of the perfect examples that are thrown in our way.

The extreme difficulty of obtaining eggs and carrying or forwarding them from long distances is only too well known to active collectors in outlandish places in our vast Dominion, and my personal opinion has been, and is, that when I have captured what I know to be a rare or a doubtful female of any kind, the correct thing is to kill it and pack it safely in cotton wool and paper, and not to run the risk of attempting to take the eggs and breed the insects. The fact of keeping the insects alive in a box with the food-plant and travelling by stage or on horseback, as my principal journeys have been made, almost compels the insect to damage its wings, and to such an extent that it will be difficult to recognize.

By enclosing what I supposed to be the food-plant of the butterfly with the female, I have lost, on many occasions, specimens which I would like to possess now.

There are other risks to be run. The females may or may not lay eggs, and these eggs may or may not prove fertile, and the young larvæ may or may not live after they come to light (this I regret to say has been my great trouble), and in every event I have always regretted the fact that I had not killed and preserved the female.

One instance I may here give of the few specimens of *C. Elis* which I was fortunate enough to take. Of this species I did not take many examples, and I have always congratulated myself since upon the fact that the few I did take are now safe in the hands of our leading col-

lectors, who possess really good representative collections, and fine examples are to be seen in the National Museum of the Geological and Natural History Survey of Canada, at Ottawa.

The variations in the appearance of the live females in the Coliadæ are most puzzling, and were it not for the similarity in the flight of several distinct forms of the same species, I fully believe the nomenclature of this genus would be even larger to-day than it already is. I beg to call your attention, as an example, to *Colias Christina*, Edw.

The variations in size, in colour, and in the markings generally, are so great, that had not several of the numerous forms been actually taken *in coitu*, it would be hard to make a collector believe that they were one and the same species.

The females of *Col. Christina*, as far as my experience goes, may be better compared to common "ribbon grass" than any other diurnal I have come across—by which I mean to say, that as it is a difficult matter to find two blades of grass exactly alike, so it is with the females of *Col. Christina*. The shades run from a pale green (the colour of *Actias luna,)* to lemon colour, and from lemon colour to bright orange, and the discal spot on the primaries is almost obsolete in some, whilst in others great uneven blotches of black or dark brown appear. When I captured this species in very large numbers in 1883, whilst collecting for Mr. Henley Grose Smith, of England, I was passing through what is known as the Red Deer River country, about seventy miles from Calgary, in the North West Territories. I was quite under the impression that I had discovered a number of new species, and that I could on my return home include a large proportion of my entomological acquaintances in describing and naming after them these peculiar butterflies. Imagine my surprise, when after referring about twenty-five or thirty of these females to Mr. W. H. Edwards, they all came back labelled *Col. Christina*, ♀.

I now give a list of the different species of Colias with which I am tolerably familiar, having captured specimens of each myself:

C. Christina, Edw., including southern form *Astrea*, Edw.

♂ quick of flight, like *Eurytheme*, and difficult to capture; ♀ short flights and slow of movement in the air. (Mr. W. H. Edwards has already figured *Col. Christina* in his excellent work on the butterflies of North America, but I have since

heard from him with pleasure that he is going to give a number of varietal forms in the new volume now being published; the plates will be for the most part figured from examples captured by me in 1883-4.)

C. Scudderii, Reak.

♀ Slow of movement, like *Christina*, and easily captured.

C. Occidentalis, Scud, including southern form *Chrysomelas*, Hy. Edw.

A lively insect, only taken when the sun was hottest and the day brightest.

C. Edwardsii, Behr.

No notes taken.

C. Alexandra, Edw.

♂ very lively, short flights; ♀ not observed.

C. Eurytheme, Boisd.

Winter form *Ariadne*, Edw.

" *Keywaydin*, Edw.

All the different forms of this insect are the liveliest I came across in the North West Territories.

C. Hagenii, Edw.

Very like the above, and almost impossible to catch on the wing, from the zig-zag movement in flying, and its long flights, often flying high in the air. Was taken in 1886 by me, at Kakabeka Falls, Lake Superior.

C. Philodice, Godt.

C. Interior, Scud.

Apparently a lazy insect; easy of capture. Very few taken in 1883 and 1884.

C. Elis, Streck.

♀ has a remarkably short flight, dropping suddenly to the ground, getting itself entangled amongst the grass and foliage; not alighting, as most Coliads do, where they can be seen, on a leaf or on a flower.

C. Elis is a new species described by Mr. Herman Strecker, after my return from the Rocky Mountains, in 1884. At present nothing is definitely known about the male of this species, although two forms of the

female have been described—an orange and an albino. Until the males are obtained from the egg, or until some collector at the summit of the Rockies, or some other range of mountains, takes the male and female *in coitu*, the male will remain a matter of doubt.

My own humble opinion is this: If the female—albino variety—is *Elis*, as described by Mr. Stecker, the chances are that there will be lemon colored males as well as orange, and that these males were taken by me in 1884. There are other species of Colias that have both lemon colored and orange males—such as *C. Christina*—upon some of which not a vestige of orange can be discovered.

ON THE POSITION OF COLIAS HAGENII, Edw.

BY W. H. EDWARDS, COALBURGH, WEST VIRGINIA.

In Papilio, 3, 159, 1883, I described Colias Hagenii as a new species. I related that Mr. T. L. Mead had brought this butterfly from Colorado, in 1871, and that we both were then satisfied that it was not *Philodice;* that in the summer of 1883, Mr. H. W. Nash, at Pueblo, Col., had sent me some chrysalids of this form, and I noticed that the dorsum was marked by two longitudinal lines, which seemed to indicate sub-dorsal lines in the larva, and which are not present in the larva of *Philodice;* that I wrote Mr. Nash to observe as to that, and he soon replied that the larvae he then had on hand did show sub-dorsal lines such as are characteristic of many larvae of *Eurytheme;* that I had been unable to get live eggs from Pueblo subsequently that year, owing to the heat which destroyed them *en route*, but that Mr. Nash had made observations on the ground, and sent on larvae in alcohol which showed broad sub-dorsal bands, that, he said, in life had had red running through them. That other larvae showed white sub-dorsal lines only, and still others had no trace of such bands or lines, any more than *Philodice*. All which was like *Eurytheme*, except that in that species the red was not within the band, but over it in broken bits; and also under the bands in *Eurytheme* were often black points. The larvae of *Eurytheme* in these varieties are figured in But. N. A., vol. 2, plate 21.

I did not at the time describe the species, but mentioned it as the form

common in the Rocky Mtns., from Colorado to British Am., which was between *Eurytheme* and *Philodice.*

In another paper in same volume of Papilio, p. 173, I said of *Hagenii:* "The color is yellow, lighter than is usual in *Philodice,* but varies in that respect, many being very green, and a large percentage, especially of the females, are not yellow, but of a peculiar shade, a sort of buff-yellow (better chrome-yellow), a shade not seen in *Philodice.* Considerably more than half the females, as reported by Mr. Nash, are of this buff-yellow, and the males frequently show more or less of it, and occasionally have a flush of orange. The markings of *Hagenii* resemble those of *Eurytheme* and *Philodice,* in the discal spots, the extra-discal points on both wings, the patch at outer angle, the shape of the black borders; but there is a closer resemblance in the borders of the females to *Eurytheme* than to *Philodice,* these being very wide, and on hind wings nearly reaching the cell, completely enclosing more or less definite yellow spots." I also repeated what Mr. Mead had said, after a season spent in Colorado, 1871, that "if there could be such a thing as a yellow *Eurytheme,* this was it."

From 1883 to the present time I have embraced every opportunity to get eggs of *Hagenii,* laid by the females in confinement, and as will be seen, have raised many broods. Now I will give the results.

1. On May 11, 1884, received eggs of the first brood of the year. (I say here that invariably the females that laid eggs have been sent with them). From these obtained, between June 8th and 15th, 14 butterflies, 10 males, 4 females, all *Hagenii.*

2. June 7, 1884, received eggs of second brood of the year. Result, between 6th and 9th July, 15 butterflies, all *Eurytheme,* 11 males, 4 females. Three of these females were albinos.

3. June 27, 1884, received eggs. Result, 12 butterflies, 8 of them *Hagenii,* 3 males, 5 females, 4 *Eurytheme,* females.

4. 29th August and 3rd Sept., 1884, received eggs. Result, 1st to 3rd Oct., 5 *Hagenii,* 2 males, 3 females.

5. This same year, 1884, I raised a brood of larvae from eggs of *Eurytheme* received 27th June. Result, 9 butterflies, 6 being *Eurytheme,* 3 males, 3 females, and 3 *Hagenii,* 2 males, 1 female.

6. 1885, May 18, received eggs of *Hagenii.* Result, 13th to 18th June, 35 butterflies, all *Hagenii,* 20 males, 15 females. The females of this brood were very large and most of them were deep colored.

7. 1886, 31st July, received eggs of *Hagenii*. Result, 28th to 30th August, 3 males, 2 females, all *Hagenii*.

8. 1887, 11th May, received eggs of *Hagenii*, the first brood of the year. Result, 9th to 14th June, 22 butterflies, all *Hagenii*, 15 males, 7 females.

9. 1887, 24th June, received eggs of *Hagenii*, the second brood of the year. Result, July 16th to 22nd, 16 butterflies, 3 males, 13 females, all *Hagenii*.

10. 1887, 5th July, received eggs of *Hagenii*, the second brood of the year. Result, July 27th to 29th, 18 butterflies, 17 being *Hagenii*, 14 males, 3 females ; 1 *Eurytheme*, female.

So that I have bred nine broods from eggs of *Hagenii* and one from eggs of *Eurytheme*, and the result has sometimes been unmixed, all the imagos being of the form of the mother, at other times mixed, part *Eurytheme* and part *Hagenii*. There have been no examples which were doubtful; all were either distinctly one form or the other. None of the first brood of any year (1884, 1885, 1887) gave mixed results, all coming out *Hagenii*, from eggs of same. But of the second brood of the year (eggs of *Hagenii* June, butterflies of July), the results were mixed. Of the later broods (imagos out in Sept. and Oct.), the result was *Hagenii* alone, but the examples in each of the late broods were too few to make the test satisfactory.

Therefore this species *Eurytheme*, heretofore known to manifest itself in three distinct forms, *Ariadne*, *Keewaydin* and *Eurytheme*, now becomes four-formed, *Hagenii* ranking with the others.

I have parted with none of these bred butterflies, and so am able to have them all before me as I write ; and can state that : 1. There is a remarkable uniformity in the color of the males, and in the width of the marginal borders. The color is lemon-yellow. Every one of the June and July imagos has a broad border on each wing, and the outlines of inner side of same are essentially alike. Nearly all these outlines may be described as erose, and only two may be called dentated. As a rule, the borders of hind wings are black, while those of fore wings are densely dusted with yellow. Every male has an orange discal spot on hind wing. Now all this is very unlike *Philodice*, in which species there is no end of variety in color, in width of borders and their inner outline, and in the color of discal spot.

As to the females, there is not one of the June and July broods but has a very broad marginal border to fore wings ; and a broad one to hind wings, more or less completely enclosing a series of spots of the color of the yellow ground of wing. In *Philodice*, that sort of border to hind wing is the exception, and there is great variation in its border, and in the length of it, as well as the breadth ; while in *Eurytheme* form of the species that sort of border is the usual. As to color, most of the females are lemon-chrome, many very deep, others lighter, running into lemon-yellow. The darker examples could not be matched in any series of *Philodice.*

I have but five examples of the last fall brood of the butterfly, which came from pupae 1–3 Oct. The two females that laid the eggs which produced these stand by them, and are lemon-chrome in color, with broad borders to hind wings. All the five butterflies are small as compared with those of the early broods ; the males have narrower borders, and very large orange spots. The three females have a narrow border to hind wing, extending from upper branch of sub-costal to second branch of median ; the color is lemon-yellow, but the hind wings are very green, and much dusted with fine gray scales, more so by far than any of the June brood. In fact, there is the same sort of difference between these October examples and those of June and July as there is between the orange forms *Ariadne* and *Eurytheme ;* that is, the form *Hagenii*, so far as I can judge by the examples under view, is itself seasonally dimorphic.

On the under side, the June and July butterflies, males, are all chrome-yellow over both wings, and of a very uniform shade throughout the series ; all have sub-marginal points or patches on both wings, a patch at outer angle of hind wing. The uniformity is remarkakle on this surface as compared with *Philodice.* Whereas the October butterflies are pale colored, whitish-yellow, the hind wings densely dusted gray ; the females still paler, still more heavily dusted ; and all have great discal spots. So that the dimorphism is borne out by the under as well as the upper side. Further observations are desirable on this fall brood, and I hope this season to be able to make them.

Colias *Eurytheme*, as well as *Philodice*, *Alexandra*, *Meadii*, *Harfordii*, hibernates in larval stage, but if the larvae are kept in a warm room, they often will go on to pupation, reaching chrysalis even in mid-winter. I suppose my larvæ of September would naturally have hibernated in Colorado, and in such case the butterflies from them would have come from chrysalis in early spring. That would make the dimorphism

of this yellow form run parallel with that of the orange, of which *Ariadne* is the winter and *Eurytheme* the summer form. (In *Philodice* there is no seasonal dimorphism discernible.)*

Polymorphic forms of butterflies are especially interesting biologically, for they may be regarded as species in the making. It is conceivable, for example, that each one of these forms of *Eurytheme*, under certain conditions, might become separated from the other, and breed true to its own type. In other words, come to be a species, and I doubt not, very many species of butterflies have come to be in this way.

I have said that none of my bred males have had orange in the wings. But I have two males, one taken by Mr. Morrison, in south Colorado, the other by Mr. Nash, at Pueblo, which have a pretty strong shade of the chrome color on fore wings that characterises so many of the females.

Hagenii is known to fly throughout the Rocky Mountain region from Colorado to British America. I had many examples from Mt. Judith, Montana; others from Bismarck, Dacotah, and along the boundary line of B. America, in same Territory. Mr. Morrison also brought examples from Montana, but I know not what part. So several have been sent me from San Bernardino, by Mr. Wright and Mr. Hulst, and I think it probable the yellow form accompanies the orange over much of the territory occupied by the latter. On the plains to the east of the mountains, these would have been regarded as *Philodice* by collectors.

The yellow male figured in But. N. A., vol. 1, on plate of Colias *Keewaydin*, fig. 7, is *Hagenii*, a very small example. Mr. Henry Edwards is quoted in the text as writing that "the male of the new species *(Keewaydin)* is constantly subject to run into the lemon-yellow variety."

As to the larvæ, they vary greatly; some having no trace of a sub-dorsal band; others have a slight yellow line in place of band; others have decided yellow lines or narrow white bands. Not one of my bred larvæ has had a sub dorsal band with red in or running through it. On the other hand, Mr. Nash has sent me several nearly mature larvæ which produced *Hagenii* butterflies, in which either the white sub-dorsal band with red line through it was present, or a white band without red. In one letter Mr. Nash writes: "Out of 24 nearly full grown larvæ of this Colias that I have, 14 have the sub-dorsal line, but none a distinct white

* Mr. Nash informs me that form *Ariadne* often flies at the end of the season, at Pueblo, the temperature having permitted the larvæ to mature.

line (band) with red running through it, as had the one that changed to the chrysalis which I last sent you."

I happen to be feeding now two mature larvæ of *Eurytheme* from eggs sent from Colorado by Mr. D. Bruce, and these vary as does *Hagenii*. One has a mere trace of sub-dorsal band—a line ; the other a continuous yellow band one-third the width of the white basal band, and with no red or black about it.*

As will have been seen, I have been under great obligation to Mr. Nash for the interest he has taken in these experiments, and the aid he has rendered in these four years. If I have succeeded in raising ten broods from eggs to imago, I have failed in as many more, from one cause or other, principally, however, the destruction of either eggs or young larvæ in the mail, owing generally to the summer heat in transit, but the trouble to Mr. Nash was all the same. In spite of miscarriages he persevered in obtaining and forwarding eggs, and felt as anxious as I did to establish the true position of this form *Hagenii*.

I lost some of the first of the broods by disease which attacked either larvæ or chrysalids, sometimes destroying every example of one or other. This led me to give up breeding in glasses for this species, and try the larvae on clover growing in pots. I kept half a dozen pots ready, with a sod of white clover in each, and when young larvae were received placed them on the leaves, and covered the whole with a muslin bag. When the leaves were much eaten, the larvae were transferred to a second pot, and so on to maturity. In this way I have avoided disease completely, and it was little trouble to take care of the larvae, beyond getting the pots ready. White clover is preferable to red, I find for such purpose, as being low growing with smaller leaves. Many species of Colias also decidedly prefer white to red clover. The same mode of treatment has been successful with other species of Colias. It is necessary to watch for small spiders, which may be on the plant, but I do not often lose larvae from this cause. Of course I intend in due time to give one, and perhaps two plates to *Hagenii*, after I have learned all I can about its dimorphism.

* These larvæ have since writing the above produced *Eurytheme*, the one with yellow s. d. band an orange male.

ON SO-CALLED REPRESENTATIVE SPECIES.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

The species of our insects having near allies in the better known or earlier known European fauna, have been called " representative " by the elder Agassiz. And this term would be sufficiently exact and useful did we not associate with it the somewhat metaphysical sense, that these forms were separately created and owe their resemblance to the arbitrary will of the Creator. But the fact is that they are allied in blood, and we have found that they were once indistinguishable members of a common fauna. But now the American forms can be picked out with more or less certainty, in their several stages, by experts, and, where this can be done, the question comes up as to the designation to be employed. Shall we call them *varieties*, geographical if you will, or *species?* For my part, having studied so many of these forms, I would give them separate specific titles. For the reason that " we may regard theoretically all species as only relatively stable ; practically we have to find out the cycle of reproduction and be guided by these results in our nomenclature."* And, further, because in one and the same fauna, species are so recognized and so named, differing as slightly from each other as do these so-called "representative" species inhabiting different continents. I would call, then, our Copper butterfly *Chrysophanus Americanus* and not *phleas* var. *Americanus*. Only where the insect intergrades, interbreeds, is the term variety, I think, admissable. As a matter of fact, our American " representative " species do neither. I cannot too often insist that we, as entomologists, are here to discriminate, to talk about and illustrate the differences we find in insects, not to lump and to obliterate. From observed distinctions are born those wider conclusions to which all science tends. We need facts bearing upon each other. Here is a difference between the English and the German mind. The latter is too apt to be satisfied with the mere accumulation of learning, the compilation of literary data, catalogues, the *machinery* of science. Forgotten papers, interesting but barren incidents, a penurious dwelling on an undigested mass of detail, these often suffice for the learned German. But the English mind uses all this as a workman does his tools. Darwin came, and the before useless stores of facts were used to open our minds to the state of things about us.

* *Grote.*—The Hawk Moths of North America, p. 13.

The particular point here, however, is that these "representative" species vary *unequally*. There are all sorts of resemblances, stronger or weaker. Among the *identical* species I have referred to *Scoliopteryx libatrix*, and this is a remarkable species from its isolated structure. It is a Xanthid form, so peculiar that it has no quite near ally, and it is the same in Hudson's Bay Territory as in Europe. I have reared it from the thistle near Buffalo. Species which have such strong characters in tuftings and cut of wing are surely the same, and I have thus no doubt that our tufted cabbage *Plusia* is the same as the European, whether it was imported or whether, like *Scoliopteryx*, it is an unchanged survival. Only a certain judgment is necessary, arising from the handling of much ma terial, to decide these points. It is a question of the *kind* of difference, not the apparent quantity. Smaller or less obvious characters are sometimes valid ones, while larger and prominent features are invalid. I should never describe as a species a form of the yellow species of *Rumia*, because black and yellow spotted insects, and especially *Geometridæ*, are prone to vary very much. Experience is especially needed in species-making. It is a little odd to notice, in this matter of varieties, how anxious some writers are to draw in the species of others, even when they absolutely do not know them, and how indifferent they are about drawing in their own varieties. They remind me of those people in ancient times who were so attentive to the wanderings of Ulysses and so oblivious of their own. My own mistakes have been sufficient to make me cautious. I do not forget that I described *Catocala sinuata* as a species distinct from *C. coccinata* Grote. But it seems to be better, when one is not quite sure, to claim the species at first, rather than describe as a variety what may turn out, in the long run, to be an independent form, having its cycle of reproduction perfectly distinct, and nowhere in the round of its life falling in with the circle of its neighbor.

ON THE GENERA ALLIED TO HOMOPTERA.

BY A. R. GROTE, A. M.

I have (CAN. ENT., vol. xv.) shown the different structure of the tibiæ in the genera of N. Am. *Noctuidæ* allied to *Homoptera* Boisd. But sometime previously I pointed out that this name was used for a section of Hemiptera, and that for this and other reasons we should probably be thrown back upon *Pheocyma* of Hübner.

This genus seems to differ by the middle and hind tibiæ being spinose. While *Ypsia* is so indifferently founded by Guenèe that he gives no character at all except a presumed larval one, I find that *Umbrina* Grote, and *Undularis* Drury, differ by the tibiæ being unarmed. In the related genus *Matigramma* the middle tibiæ alone seem spinose, at least in my *rubrosuffusa* they are so. But this is not the *type*, which must be studied for this character. Again, I have many years ago proposed to distinguish *Zale* by the generic character of the body tufts. Finally, the otherwise amply distinct genus *Homopyralis* has the slender tibiæ unarmed. It is evident, therefore, that good and valid characters separate the genera allied to *Homoptera*, or rather *Pheocyma*, and that my *Ph. unilineata* and the rest may be arranged by the tibial armature, although superficially so much resembling *Ypsia*. Guenèe takes no note of this, and seems quite at a loss in this group of the Owlet Moths. I had myself very little material in my collection of these genera, and I neglected their exact study accordingly.

It is with much pleasure that we have just learnt of the appointment of the Rev. George W. Taylor, of Victoria, Vancouver Island, B. C., as Honorary Provincial Entomologist of British Columbia. Mr. Taylor has been an active member of our Society for some years, and has done much good work, not only in Entomology, but in general Natural History, by working up the little known but exceedingly interesting fauna of Vancouver Island. He is one of the best Conchologists in the Dominion, and has the finest collection of British Columbian shells extant. His knowledge of Ornithology and Botany will materially enhance the value of his work as Provincial Entomologist, and his appointment cannot but result in great benefit to the farming community of the Province. We tender our sincere congratulations, not only to Mr. Taylor, but also to the Minister of Agriculture and the Provincial Legislature, for the wisdom that has been displayed in the choice of an incumbent for this important office. There are many "first-class pests" which require attention in our Pacific province already, and doubtless, now the Canadian Pacific Railroad is completed, many others from the east may be expected to be introduced by that means, and it is only by having the services of a trained scientific student at their disposal, to identify the marauders, and give information concerning the habits and best means of remedying their attacks, that the farmers can hope to protect themselves against the injuries yearly inflicted by insects.

ON THECLA FALACER AND INORATA.

BY A. R. GROTE, A. M.

The object of this note is to draw attention to a paper printed at Demopolis, Ala., Dec., 1870, in which I endeavored to reply to Mr. Scudder's objections to our determination of Hübner's Plate of *calanus*. I say: "The chances are against Hübner's having figured both sexes of the usually unspotted *T. inorata* with the spotted secondaries of *calanus* nob. Leconte has certainly figured *T. inorata*, and, as we stated before, Boisduval has used the specimen of Godart's *T. falacer* (*T. Edwardsii* Auct.) while furnishing the text. Boisduval considered Leconte's Plate as representing a form of *T. falacer*, and erroneously so, as Leconte figured for the first and only time *T. inorata*." Prof. Saunders afterwards describes the larva of *inorata* in CAN. ENT. I conclude that the two species are correctly separated and named by us in Trans. Am. Ent. Soc. I., 172, and give the synonymy. I wish to draw attention to this paper of mine, to state that, in any case, Mr. Scudder's version of Hübner's Plate is *uncertain*, from the similarity of the two species. Also, that we, having been the first in print to separate, name, and describe the two, our determination, being certain, should henceforth obtain and have priority as regards these two species of *Thecla*. The paper above referred to is now out of print, but is in several libraries and was generally distributed.

[NOTE.—Mr. Scudder writes in reply to our enquiry, that "there is not the slightest doubt as to what species Hübner figured under the name of *calanus;* it is certainly the *inorata* of Grote & Robinson." . . . "for the proper synonymy of these species, see Buffalo Bulletin, 1876, p. 110."—EDITOR *per* J. F.]

BOOK NOTICES.

The following publications have been received:—"Belostomidæ and some other Fish Destroying Bugs," by George Dimmock; "Maple Sugar and the Sugar Bush," by Prof. A. J. Cook; "Entomologica Americana," vol. iv., Nos. 1, 2 and 3; "The Conchologists' Exchange"; Journal of the Columbus, Ohio, Horticultural Society; Bulletin of the Iowa Agricultural College, Botanical Department; Proceedings of the Natural Science Association of Staten Island; "The Owl," Glen Falls, N. Y.; "Science Gossip," Chatto & Windus, London, England; "The Prairie Farmer"; "The American Agriculturist;" "The Ottawa Naturalist;" etc.

CORRESPONDENCE.

CARABUS AURATUS.

Dear Sir: Mr. Grote's reference, in your June issue, to Dr. Harris's observation on *Carabus auratus*, deserves some attention. The "Insects Injurious to Vegetation" was one of my early helps to an introduction to Entomology, and in reading the passage referred to, I was led, in my inexperience, to speculate upon the probability of meeting with the beautiful beetle mentioned.

Many years ago Mr. P. S. Sprague showed me the specimen itself in Dr. Harris's collection, now in the care of the Boston Natural History Society, and told me that he had been led to surmise that this was Dr. Harris's first insect capture, and that it had been the means of turning his attention to the study and observation of insects, with the excellent result so familiar to us all. It is hardly necessary to say that the identification was correct, but the specimen was an entirely accidental introduction, and did not perpetuate its species.

It seems to me that it would be very desirable if those having a knowledge of the accidental occurrence of foreign insects in our country would publish the particulars.

F. BLANCHARD, Lowell, Mass.

PAPILIO CRESPHONTES.

Dear Sir: On May 8th, I observed four caterpillars of *Papilio Cresphontes* about two-thirds grown feeding on the Lombardy Poplar *(Populus dilatata)*. The *Cresphontes* has been increasing rapidly since its first appearance in this locality in 1878. Its caterpillar has hitherto seemed to be restricted to plants of the Rue family. Leaving the Orange of the Southern States, it came north to feed upon the Prickly Ash *(Xathoxylum Americanum)* and Hop-tree *(Ptelea trifoliata)*. Both these being scarce in this locality, it has taken to the Lombardy Poplar. It may be remarked that *Populus* is botanically widely separated from the *Rutaceæ*.

W. P. SHANNON, Greensburg, Indiana.

June 27, 1887.

THE ANNUAL MEETING.

The Annual Meeting of the Entomological Society of Ontario will be held in London during the month of October. The exact date is not yet decided upon, but it will be announced in our next issue.

Mailed Sept. 17.

The Canadian Entomologist.

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THE NORTH AMERICAN CALLIMORPHAS.

BY H. H. LYMAN, M. A., MONTREAL.

The North American species of the genus Callimorpha are exceedingly interesting both from their beauty and from the extreme variations to which some of the species are subject, and which has given rise not only to the creation of numerous synonyms, but also to distinct species being regarded as merely varieties of other forms.

A very slight study of the literature of this subject is sufficient to show that these forms have been very badly treated by the "authorities," whether "lumpers" or "splitters," who have in this instance been but blind leaders of the blind; and some of those who during the last two years have endeavored to clear up matters a little, have not succeeded in making confusion less confounded. This confusion is also largely owing to the inaccessibility of the figure of Boisduval's species, and to the description by subsequent writers of new forms without any illustrations, which is particularly objectionable in the case of a group subject to great variation.

My attention was first seriously directed to this genus about six or seven years ago, by a paper read before the Montreal Branch of the Entomological Society of Ontario, by Mr. F. B. Caulfield, who advanced the opinion that several distinct species were confused under the all-embracing name of *Lecontei*.

At that time the only white and black form which I had seen was the true *Lecontei*, of which I had an excellent series showing most extraordinary variations, and I was disposed to listen very incredulously to Mr. Caulfield's theories; but an examination of his specimens convinced me that he had some grounds for his views, and I therefore turned my attention to the group, and have studied it as I have had time and opportunity since.

Besides my own and the other Montreal collections, which now contain a very good series of these moths, I have had the opportunity of examining the collections of the Museum of Comparative Zoology at Cambridge, Mass., the collection of the Boston Society of Natural History, the Harris collection, the collections of Messrs. Henry Edwards, B. Neumoegen and Herman Strecker, and last year the British Museum collection. I am also indebted to Mr. A. G. Butler, of the British Museum, for colored drawings of Walker's type specimens which he sent me in 1882, and to Mr. B. P. Mann and Mr. Scudder, for a copy of the original description of Boisduval's *Lecontei.* I have therefore not approached this difficult subject lightly, and it is only because I feel confident that I can clear up some of the errors which have so long prevailed that I now venture to publish the results of my studies. In any attempt to unravel the tangle into which these forms have been thrown by the leaders of entomological science, the first thing to be done is to find out what *Callimorpha Lecontei* of Boisduval really is, instead of jumping to the conclusion that any white and black specimen, or even a pure white one for that matter, is that form. The description of *Lecontei* given in Guerin's "Iconographie du Regne Animal de G. Cuvier," may be translated as below:

Species with White Secondaries.

CALLIMORPHA LECONTEI, Boisd. Guerin, Iconographie, etc., p. 518, plate 88, fig. 4.

(Figures 1 and 2.)

"Body white, with the top of the head of a pale yellow and a black or brown line extending from the prothorax to the extremity of the abdomen.

"Primaries black or brown, according to the more or less fresh condition of the insect, each having five large rounded and irregular white spots, touching each other sometimes as in the specimen figured, in which the two spots in the middle are united, while in another it is the two spots at the apex which are confluent.

"Secondaries immaculate.

"The under side resembles the upper, but having the black parts very pale. Legs lightly tinted with yellow.

"Expands 52 milli. Hab.—North America.

This description, taken in connection with the figure of which I previously had a drawing, but which I had the pleasure of seeing for myself

last year through the kindness of Mr. W. F. Kirby, enables me to definitely determine the true *Lecontei*, of which I have a full series, and typical forms of which are shown in figures 1 and 2 of the accompanying plate.

This species varies in almost every conceivable manner by the spots becoming confluent in different ways, and it even mimics the forms with yellow hind wings in occasionally having the white suffused with a tinge of ochre yellow. But there is one way in which it never varies, and that is that there is always a prominent process on the brown border of the inner margin of primaries, nearly one-third from the inner angle from which a band usually extends towards the apex. In expanse my specimens vary from 44–52 m.m., the average being about 48 m.m.

C. Leucomelas H. Sch. is only a synonym of *Lecontei*, being the form represented in fig. 2, in which the two spots towards the apex are united. Fig. 3 is only a further variety of *Lecontei* showing the gradual transition to fig. 4, which is a true specimen of the typical *Militaris* of Harris, as figured and described in his Insects Injurious to Vegetation. Fig. 5 represents a very interesting specimen which, though undoubtedly a variety of *Lecontei*, mimics *Interrupto-marginata* (what a pity it is that we cannot use Harris's manuscript name *Anchora!)* very closely in markings.

The form which Walker and many other entomologists have mistaken for *Lecontei* is that figured Nos. 7–9, of which I shall have more to say later on.

The other forms described by Walker were *Confinis*, *Contigua* and *Conscita*.

CALLIMORPHA LECONTEI, var. CONFINIS, Walk.

Hypercompa Confinis, Walk., Cat. Lep. B. M., III., p. 651.

(Figure 6.)

"Alba; caput, prothorax, abdomen, basi et coxæ anticæ ex parte lutea; thorax et abdomen fusco vittata; alæ anticæ marginibus plerumque fasciaque obliqua fuscis.

"White. Head, prothorax, fore coxæ and abdomen at base luteous. Proboscis tawny. Palpi with black tips. Antennæ black. Thorax and abdomen with a brown stripe. Fore wings brown with a discal slightly angular white stripe, and an elongate triangular oblique sub-apical white band. Length of the body 6 lines; of the wings 18 lines. *a—d*, United States, from Mr. Dyson's collection."

This form varies somewhat, but a fairly typical specimen is shown in fig. 6. It may possibly be a distinct species, but I believe it to be merely a variety of *Lecontei* of the *Militaris* type, in which the tooth-like projections extending backwards from the costa have disappeared.

CALLIMORPHA CONTIGUA, Walk.

Hypercompa Contigua, Walk., Cat. Lep. B. M., III., page 651.
Callimorpha Reversa, Stretch (in part), Ent. Amer., I., p. 104.
(Figure 10.)

"Alba; caput et prothorax lutea; palpi nigri, basi lutei; antennæ nigræ; thorax et abdomen fusco univittata; alæ anticæ marginibus plerumque fascia postmedia vittaque subapicali fuscis; posticæ macula submarginali fusca.

"White. Head, prothorax and fore coxæ luteous. Proboscis tawny. Palpi black, luteous at the base. Antennæ black. Thorax and abdomen with a brown stripe. Fore wings brown, with a white discal stripe, which widens from the base to a little beyond the middle, and with two large sub-apical white spots. Hind wings with a small brown spot near the hind border. Length of the body 6 lines; of the wings 18 lines.

"*a*. United States."

This description, if possessing the merit of briefness, has certainly very little else to commend it, and so Mr. Saunders in his synopsis described the markings of the wings as follows:

"Primaries white with blackish-brown stripes; one along the costa to near the tip; one on the inner margin, joined at its extremity with an oblique transverse band, extending to the costa; from the centre of this latter a stripe extends to the hind margin, somewhat enlarged at its termination, where it is centred with white. Hind margin partially edged with brownish-black.

"Secondaries white, immaculate."

In order to make sure that the form so clearly described by Mr. Saunders was the one that Walker intended by his description, I sent a drawing of this form and of some others to Mr. Butler, who returned them to me with sundry notes upon them, and confirming this determination as correct. These drawings I sent to Mr. Stretch in 1885, upon the appearance of his description of *Reversa*, and asked him if his species was not the *Contigua* of Walker as illustrated by my drawing. To this letter I have never received any answer, nor have I been able to get my drawings

back, although I have written to him repeatedly to ask him to return them. My last letter, under date of Nov. 15th, 1886, I registered in order to make sure that it would reach him, and subsequently learned from the P. O. authorities that it had been duly delivered to the addressee. *Contigua* is a particularly well marked and constant form, and I think there can be no doubt that it is a good species. It varies slightly as all species will, but I have never seen an example which tended in any way to connect it with any other form.

I now come to the form which Doubleday and Walker mistook for *Lecontei*, and which has been almost universally confused with that species, but it differs so greatly from the true *Lecontei* that I feel convinced that it is a distinct species.

CALLIMORPHA CONFUSA, n. sp.

Hypercompa Lecontei, Walk. (not Boisd.), Cat. Lep. B. M., III., p. 651.

(Figures 7—9.)

Head and collar orange-yellow, the latter with two dark brown spots. Palpi orange-yellow tipped with black or dark brown. Antennae black. Thorax white, yellowish towards the abdomen, with a wide central brown stripe. Abdomen white, yellowish at base and tip, and with a dorsal dark brown stripe. Beneath, legs ochre-yellow; anterior coxae with a black spot; fore and median femora, tibiae and tarsi, dark brown exteriorly.

Primaries dark brown, with from five to six rather large irregularly shaped white spots, and two or three small ones. Of the large spots the one at the base is oblong, the second is generally bifid, but occasionally entirely divided, forming two distinct spots. The third is usually nearly round, the apical spot oval or oblong, occasionally united with the third; the fifth spot near the outer margin is large, subtriangular and sometimes broken into several spots.

Secondaries white, immaculate; but occasionally with a partial brown border running from a little below the apex to the middle of the outer margin, and with one or two brown dots near the anal angle. Beneath, primaries have the brown markings much more strongly reproduced than in *Lecontei*, and far more suffused with yellow than in that species.

Expands 37–42 m. m. = $1\frac{7}{16}$–$1\frac{5}{8}$ inch.

Larva found feeding on *Cynoglossum officinale*, L. (Common Hound's Tongue), one or two on a plant, June 12th, 1881.

Length 1⅜ inch, nearly cylindrical. Head small, black and shining, with a few short blackish hairs. Body above black, with a yellow mottled with orange dorsal stripe, and two similar but very much broken ones along each side. Between the dorsal and subdorsal stripes there is a very broken line of a bluish white colour. Each segment has from ten to twelve small black warts from each of which radiate a few black and grey bristles. Beneath bluish slate grey.

On June 19th, it was observed that these larvæ had changed their appearance as follows: The dorsal stripe is deep yellow and is composed of two oblong spots placed longitudinally on the middle of each segment, and several lighter yellow ones placed transversely on the folds between the segments. The upper lateral stripe is narrower and more broken, being composed of marks of irregular shapes and sizes. The lower stripe is broken up into a few scattered streaks, and the broken line of bluish white spots has disappeared.

Beneath, pale drab with a tinge of yellow and a few minute black dots. Prolegs same colour as the under surface, but with a shining black patch on the outside of each. Feet dark brown with light markings.

Entered pupa stage June 19th, 20th; emerged July 12th to 14th; duration of pupa stage, 23 to 24 days.

One female laid a large batch of eggs July 14th; examined under the microscope were found to be smooth, round, flattened at base, honey yellow; diameter .028 of an inch.

Eggs hatched July 25th; duration of egg stage 11 days.

Young larvae, length .10 of an inch. Head brown, shining, with a few hairs; body transparent yellow, warts placed as in mature larva, brown, shining, with a few light coloured hairs; feet brown. I left home early in August and took these larvae with me, but was obliged to change their food to Dandelion. On August 13th the following description was taken:

Length $\frac{5}{16}$ of an inch. Head black; mouth parts light coloured. Body dull white, marked with dark brown and bright yellow. The dorsal region is white, and there is a double, broken and irregular subdorsal stripe of dark brown. On each side there is a broken but distinct bright yellow band, and below the spiracles there is an irregular brown band, lighter than the sub dorsal one. Warts small, black, shiny, with a few short hairs, principally black, but a few light coloured. Beneath dirty white; feet brown; prolegs dirty white, with a brown patch on outside.

When these larvæ are shaken off a leaf they let themselves down by a silk thread. Subsequently I lost all these larvæ by death. This species varies almost as much as *Lecontei*, but not so as to approach any other form as far at least as I have seen, and I have examined over thirty specimens. It is much smaller than *Lecontei*, and the underside is strikingly different.

It never varies in the direction of *Militaris*, and in some specimens the white spots are very much reduced in size, as shown in fig. 9. As Mr. Caulfield has pointed out,* *Lecontei* varies in the direction of albinism *Confusa* in the direction of melanism.

In the Cambridge Museum there are four specimens of this species, with a blank label attached by Prof. Agassiz. Three of these are from Trenton, N. Y., which is the locality that the British Museum specimens came from, and one is from Kanawha, West Virginia.

CALLIMORPHA SUFFUSA, J. B. Smith.

Callimorpha Reversa, Stretch (in part), Ent. Amer. I., p. 104.

Callimorpha Suffusa, J. B. Smith, Ent. Amer. III., p. 25.

(Figure 11.)

This form has been so clearly described by Mr. Smith that it is not necessary for me to add anything in the way of description to what he has already published. I had myself intended to describe it as new, giving it the name of one of the sisters of Clymene, on account of its remarkably close resemblance, in everything but colour, to the species named after that nymph, and I cannot help thinking that the name chosen by Mr. Smith is by no means appropriate.

This form is very distinct and varies very little, if I may judge from a large series in the Cambridge Museum which were taken by Mr. Boll at Dallas, Texas. Its distinctness from *Contigua* is evident, from the fact that the markings are not only wholly dissimilar, but the transverse brown line from inner angle reaches the costa about two-fifths from the base, whereas in the latter the point of contact is about two-fifths from the apex.

Notwithstanding the total dissimilarity of these forms, Mr. Stretch has evidently regarded them as one species, but there is one point in which his diagnosis is unintelligible to me; he says, "in *Lecontei* the main transverse band starts from inner angle and goes to the apex,

* 16th Report of Ent. Soc. Ont., page 38.

while in *Reversa* it starts from *outer margin* and goes to the anal angle." The italics are mine, and I would suggest that he probably means the costa or anterior margin.

Mr. Smith is also in error in charging Mr. Caulfield with mistaking this form for *Lecontei*, as the three forms to which that gentleman referred* were *Lecontei*, *Contigua* and *Confusa*.

Mr. Smith is also quite astray in saying that *Lecontei* is distinct from *Militaris*, and I therefore judge that he has himself mistaken *Confusa* for *Lecontei*.

CALLIMORPHA FULVICOSTA, Clemens.

Hypercompa Fulvicosta, Clem., Proc. Acad. Nat. Sc. Phil., p. 536.
Callimorpha Vestalis, Pack., Proc. Ent. Soc. Phil. III., p. 108.
(Figure 12.)

Head and collar deep yellow, palpi yellow tipped with dark brown, antennæ dark brown. Thorax white, tipped with yellow behind. Beneath, legs yellow, fore and median tibiæ and tarsi brown exteriorly. Abdomen creamy white, yellowish at base and tip.

Primaries white; costa, especially below, edged with ochre yellow or occasionally brownish.

Secondaries white, immaculate.

Expands, 48–50 m.m. = 1⅞–2 in.

This form is, I believe, a distinct species, as I have never seen any specimens which varied from the type further than in the presence or absence of a slight brown edging to costa of primaries.

It occurs abundantly along with *Suffusa* at Dallas, Texas, where a large number were taken by Mr. Boll. The one figured on the plate was one of these, and I am indebted to Dr. Hagen for it.

Species with Yellow Secondaries.

These species are fewer and more easily separated than those in the former section, and if it had not been that one of the forms has been overlooked by most entomologists, it would not be necessary for me to treat of them at all.

CALLIMORPHA CLYMENE, Esper.

Hypercompa Clymene, Esper Schm. IV., 22, 10 pl. 182; Noct. 103, Fig. 1.

Callimorpha Carolina, Harris. Report, p. 243 (1841).

Head and collar orange yellow, the latter with two deep brown or

* 16th Rept. Ent. Soc., Ont., page 38.

black dots; palpi orange yellow tipped with black, antennæ black. Thorax white, yellowish behind, with a broad central brown band. Beneath, thorax yellow, legs yellow, fore coxæ with a black or brown dot, fore and median femora and tibiæ dark brown exteriorly, fore and median tarsi brown. Abdomen ochre-yellow with a dorsal row of brown dots which are sometimes almost obsolete. Primaries marked exactly as in *Suffusa*, (fig. 11). Secondaries ochre-yellow, immaculate, or with a brown dot near anal angle. Beneath, all the wings are deep ochre-yellow, the brown markings of primaries being reproduced more or less distinctly except towards apex and outer margin. Expands, 53–58 mm. = 2 1/16–2 1/4 inch.

This species is well known and distinct. It varies somewhat in the maculation of primaries, but not so far as ever to render its determination doubtful.

CALLIMORPHA INTERRUPTO-MARGINATA, De Beauv.

Bombix Interrupto-marginata, De Beauv., Ins. Afriq. et Amer., p. 265, pl. 24, figs. 5, 6.

Callimorpha Anchora, Harris, MS.

Hypercompa Comma, Walk. Cat. Lep. B. M. III., p. 652.

Head whitish, front and vertex ochre-yellow, palpi yellow tipped with black. Collar and thorax white with a broad median brown band. Beneath, legs as in *Clymene* except that the spot on fore coxæ is wanting. Abdomen ochre-yellow with a dorsal brown stripe.

Primaries creamy white, suffused with yellow at the apex, with a dark brown stripe along the costa to near the apex, a band of the same colour along the inner margin to inner angle, near which it branches, sending forward half way to the costa a broad, slightly curved band, which marks, when the wings are closed, have a slight resemblance to an anchor.

Outer margin with an incomplete brown border, widest at the middle.

Secondaries ochre-yellow with a brown spot near anal angle.

Beneath ochre-yellow with the brown markings partially reproduced.

Expands, 47–49 mm.

Hab., Canada to Florida.

This very distinct species seems to be the most constant of any and it is a shame that it should be burdened with such an abominable name. The markings are very close to fig. 5, except that there is no spur on the costal border, and that there is the brown spot on secondaries.

CALLIMORPHA CONSCITA, Walk.

Tanada Conscita, Walk. Cat. Lep. B. M. XXXII., p. 377.

Callimorpha Lactata, J. B. Smith, Ent. Amer. III., p. 25.

"Mas. Alba; caput luteum; palpi oblique ascendentes, verticem non superantes, articulo 3^{tio} longi-conico; antennæ nigræ, setosæ; thorax antice luteus; abdomen flavum; pedes flavi, fusco varii; alæ anticæ costa lutea; posticæ flavæ. Var. B. Abdomen flavo-album; alæ posticæ flavo-albæ, anticæ costa flavo-alba. Fœm.—Antennæ sub setulosæ; abdomen album; alæ albæ; anticæ costa lutea.

"Male. White; head and fore part of the thorax luteous. Proboscis tawny. Palpi luteous, pubescent, obliquely ascending, not rising so high as the vertex; third joint elongate-conical, not more than half the length of the second. Antennæ black, setose. Abdomen yellow, not extending beyond the hind wings; apical tuft very small. Legs yellow, smooth; spurs moderately long; anterior tibiæ and tarsi brown above. Wings elongate, fore wings slightly rounded at the tips; costa luteous. Hind wings yellow. Var. B.—Abdomen, except the apical tuft, yellowish white. Hind wings, yellowish white. Fore wings, with a yellowish white costa. Female.—Antennæ very minutely setulose. Abdomen and wings white, except the costa of the fore wings. Length of the body, 7 to 8 lines; of the wings, 20 lines."

It would seem that the female above mentioned must have been a specimen of *Fulvicosta*, but the male is a good species, although its describer treated it so badly as to put it into a wrong genus. Mr. Butler sent me, in 1882, a coloured drawing of Walker's type, and I immediately recognized that it bears the same relation to the species with yellow secondaries as *Fulvicosta* does to those with white ones.

I think that the fact that Walker mistook *Fulvicosta* for the female of this species should not destroy the validity of his name, and I have therefore cited Mr. J. B. Smith's name *Lactata* as a synonym.

The results of my studies would lead me to group these species as follows:

CALLIMORPHA, Latreille.

1. Clymene, Esper.
   Carolina, Harris.
2. Interrupto-marginata, De Beauv.
   Anchora, Harris, MS.
   Comma, Walk.

3. Conscita, Walk.
   Lactata, J. B. Smith.
4. Lecontei, Boisd.
   Militaris, Harris.
   Leucomelas, H. Sch.
   ———var. Confinis, Walk.
5. Contigua, Walk.
   Reversa, Stretch (in part.)
6. Confusa, Lyman.
   Lecontei, Walk. (not Boisd.)
7. Suffusa, J. B. Smith.
   Reversa, Stretch (in part.)
8. Fulvicosta, Clemens.
   ♀ *Conscita*, Walk.
   Vestalis, Packard.

I am very anxious to obtain larger series of specimens, showing the extremes of variation of all the forms, from all over the continent, and will be glad to purchase or obtain them in exchange for other specimens. Collectors will also confer a favour if they will report to me which species occur in their localities.

EXPLANATION OF PLATE.

No. 1. Callimorpha Lecontei, Boisd.....Montreal
" 2. " " " ..... "
" 3. " " " ..... "
" 4. " " " var. Militaris, Harr. "
" 5. " " " var..... "
" 6. " " " var. Confinis, Walk., Minnesota
" 7. " Confusa, Lyman.....Montreal
" 8. " " ..... "
" 9. " " ..... "
" 10. " Contigua, Walk ..... "
" 11. " Suffusa, J. B. Smith.....Kansas
" 12. " Fulvicosta, Clemens.....Texas.

STUDIES OF THE NORTH AMERICAN PROCTOTRUPIDÆ, WITH DESCRIPTIONS OF NEW SPECIES FROM FLORIDA.

(Paper No. 3.)

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

Sub-family MYMARINÆ.

LXVII. *Camptotera* Foerster.

LXVIII. *Ooctonus* Haliday.

107 (1). *Ooctonus longipes*, n. sp.

Female. Length .03 inch. Head and thorax black. Antennæ 11-jointed, scape and pedicel dilated below, flagellum and club pale brown, funicle joints slender, cylindrical, club greatly and enormously enlarged, not jointed. Legs long, slender, yellow. Abdomen ovate, black, shining; petiole slender, yellowish. Wings hyaline, very narrow, with extremely long ciliæ; submarginal vein short; marginal vein punctiform.

Hab.—Florida. Described from one specimen.

LXIX. *Limacis* Foerster.

108 (1). *Limacis aspidioticola* Ashm.

Aphelinus aspidioticola Ashm. Orange Insects, 1880, p. 9, pl. ii., f. 1, 4, 7, 9, 13.

Hab.—Florida.

LXX. *Gonatocerus* Nees.

109 (1). *Gonatocerus dolichocerus*, n. sp.

Female. Length, .07 inch. Head, thorax and the sessile abdomen above, black, the latter beneath, brownish-yellow. Antennæ 11-jointed, as long as the whole body, black; the club is greatly lengthened, thick and not jointed. Legs including coxæ, pale yellowish-brown, the fore tibiæ obfuscated along upper edges, posterior tibiæ and tips of femora, dusky. Wings hyaline, fore wings broadened and rounded at tips, surrounded with short ciliæ; sub-marginal vein, the only one apparent, black; hind wings linear.

Hab.—Florida. Described from one specimen.

110 (2). *Gonatocerus nigritarsis*, n. sp.

Female. Length .05 inch. At once distinguished from the other species by its smaller size, shorter antennæ, brown, not black, and the less

thickened antennal club; the legs are yellowish, the fore tibiæ not obfuscated along upper edges, although the posterior pair are; all tarsi dusky; abdomen entirely black.

Hab.—Florida. Described from one specimen.

This species somewhat resembles a European species in my collection, *. e., Gonatocerus ater* Foerster, but the paler colored legs easily separate it.

LXXI. *Litus* Haliday.

111 (1). *Litus armatus*, n. sp.

Female. Length .02 inch. Bright yellow. Eyes and flagellum brown. Antennæ 9-jointed, much longer than the whole body; scape and pedicel large, dilated below, first funicle joint short, not longer than wide, second as long as the thick club or terminal joint, other joints gradually shorter. Abdomen sessile with a dusky shade above at base; ovipositor exserted, stout, black, about two thirds as long as abdomen. Wings hyaline, narrow, with long ciliæ.

Hab.—Florida.

LXXII. *Alaptus* Walker.

112 (1). *Alaptus pallipes*, n. sp.

Female. Length .02 inch. Black. Head very large, much broader than the rather slender thorax. Antennæ 8-jointed, brown; scape short, dilated, pedicel small, first funicle joint shorter than second, second longer, third short but thicker than second, fourth much longer and thicker than third, fifth still longer but not so thick, club greatly swollen, as long as the scape. Abdomen sessile, ovate, not as long as thorax. Legs pale. Wings hyaline, with very long ciliæ, the fore wings spatulate, the hind wings linear.

Hab.—Florida.

LXXIII. *Signiphora* Ashmead.

113 (1). *Signiphora flavopaliata* Ashm. Orange Insects, 1880, p. 30, pl. ii.

Hab.—Florida.

LXXIV. *Eustochus* Haliday.

114 (1). *Eustochus xanthothorax*, n. sp.

Female. Length .03 inch. Head, prothorax and abdomen black; mesothorax and legs bright yellow; antennæ pale brown; tarsi four jointed; antennæ apparently (?) 9-jointed; tip of abdomen surrounding

anus, yellow. Wings extremely narrow, with long ciliæ; marginal vein elongated.

Hab.—Florida.

LXXV. *Doriclytus* Foerster.
LXXVI. *Mymar* Haliday.
LXXVII. *Pteratomus* Packard.

115 (1). *Pteratomus Putnamii* Packard. Guide to the Study of Insects, p. 202, pl. iii., f. 8, 8°.

Hab.—Massachusetts.

This genus is probably identical with *Mymar* Haliday.

LXXVIII. *Cosmocoma* Foerster.

116 (1). *Cosmocoma elegans* Howard. U. S. Agric. Rep., 1880, p 370. Hab.—District of Columbia.

There is a *Cosmocoma elegans* Foerster, in Europe, and this species may be changed to *C. Howardii.*

117 (2). *Cosmocoma maculipes*, n. sp.

Male. Length .03 inch. Black. Antennæ 13-jointed, longer than the whole body; scape and pedicel pale brown, flagellum black. Leg and petiole pale yellowish; femora and posterior tibiæ with a dusky blotch above. Wings hyaline.

Hab.—Florida.

This species is allied to *C. elegans* How., but the blotches on thighs and tibiæ will readily distinguish it.

LXXIX. *Ceraphractus* Walker.
LXXX. *Stictothrix* Foerster.
LXXXI. *Anaphes* Haliday.

118 (1). *Anaphes gracilis* Howard. U. S. Agric. Rep., 1880, p. 370
Hab.—California.

119 (2). *Anaphes mellicornis*, n. sp.

Female. Length .03 inch. Shining black. Antennæ 9-jointed, honey-yellow, the club dusky. Legs honey-yellow, femora and posterior tibiæ somewhat testaceous. Wings hyaline.

Hab.—Florida.

Sub-family DIAPRIINÆ.
LXXXII. *Coptera* Say.
(? *Entomacis* Foerst.)

120 (1). *Coptera polita* Say. LeConte's Ed. Say's Works, ii., p. 728. Prov., Le Nat. Can., xvi., p. 181.

Hab.—Indiana, Canada.

LXXXIII. *Platymischus* Westwood.

121 (1). *Platymischus torquatus* Prov. Le Nat. Can., vol. xvi., p. 182. Hab. Canada.

122 (2). *Platymischus abdominalis* Say (Psilus). LeConte's Ed. Say's Works, ii., p. 729. Hab.—Indiana.

LXXXIV. *Galesus* Curtis.

123 (1). *Galesus ciliatus* Say (Psilus). LeConte's Ed. Say's Works, i., p. 383. Hab.—Indiana.

124 (2). *Galesus obtusus* Say (Psilus), l. c. i., p. 383.

Hab.—Indiana.

125 (3). *Galesus colon* Say (Psilus), l. c. ii., p. 727.

Hab.—Indiana.

126 (4). *Galesus quebecensis* Prov. Petite Faune Ent. du Canada, ii., p. 559. Hab.—Canada.

127 (5). *Galesus floridensis*, n. sp.

Male. Length 06 inch. Black, polished, with some sparse scattered pile, except on collar, where it is dense and white. Face prolonged; antennæ 14-jointed, piceous, much longer than body, joints with long white hairs; scape considerably swollen in the middle. Legs: coxæ, tips of femora, tibiæ and tarsi honey-yellow, femora black. Wings subhyaline. Hab.—Florida.

LXXXV. *Aneurhynchus* Westwood.

128 (1). *Aneurhynchus apicalis* Say, l. c. ii., p. 727.

Hab.—Indiana.

129 (2). *Aneurhynchus spinosus* Prov., l. c. ii., p. 56.

Hab.—Canada.

130 (3). *Aneurhynchus inermis* Prov. Add. Faune Hym., p. 176.

Hab.—Canada.

131 (4). *Aneurhynchus aneurus* Prov., l. c., p. 176.

Hab.—Canada.

LXXXVI. *Labolips* Haliday.

LXXXVII. *Cephalonomia* Westwood.

132 (1). *Cephalonomia hirticollis*, n. sp.

Male. Length .08 inch. Black, highly polished. Antennæ 12-

jointed, dark red, scape paler at base, funicle joints very small, the four terminal joints greatly enlarged or swollen moniliform, the last joint is a little longer than broad. Prothorax densely covered with white pile. Legs dark red. Wings hyaline, veins yellowish.

Hab.—Florida.

133 (2). *Cephalonomia floridana*, n. sp.

Male. Length .05 inch. Entirely black, polished, excepting knees and tarsi, which are piceous. Antennæ 12-jointed, three terminal joints large moniliform, last joint being about as large as the two preceding ones together. Collar hairy; wings hyaline.

Hab.—Florida.

LXXXVIII. *Paramesius* Westwood.

134 (1). *Paramesius terminatus* Say (Psilus). LeConte's Ed. Say's Works, ii., p. 727. Hab.—Indiana.

LXXXIX. *Idiotypa* Foerster.

XC. *Hemilexis* Foerster.

135 (1). *Hemilexis mellipetiola*, n. sp.

Male. Length .05 inch. Slender, black. Antennæ 13-jointed, moniliform, gradually incrassated, red-brown; scape, legs and petiole of abdomen, honey-yellow, femora slightly obfuscated. Thorax without grooves. Metathorax covered with white pile. Wings hyaline, ciliate; no marginal vein. Hab.—Florida.

XCI. *Spilomicrus* Westwood.

136 (1). *Spilomicrus longicornis* Prov. Petite Faune Ent. du C., ii., p. 56. Hab.—Canada.

137 (2). *Spilomicrus foveatus* Prov. Add. à la Faune Hym., p. 176. Hab.—Canada.

XCII. *Diapria* Latreille.

138 (1). *Diapria brevicornis* Say (Psilus), l. c. i, p. 221.

Hab.—St. Peter's River.

139 (2). *Diapria erythrothorax*, n. sp.

Male. Length .05 inch. Stature of *Diapria tritoma* Thoms. Head and abdomen black; thorax red; antennæ and legs honey-yellow; wings hyaline. Hab.—Florida.

XCIII. *Loxotropa* Foerster.

140 (1). *Loxotropa mellea*, n. sp.

Male. Length .09 inch. Honey-yellow with long sparse, scattered

pubescence. Eyes and tip of abdomen brown. Antennæ 14-jointed, first funicle joint longer than pedicel or the second funicle joint, other joints moniliform, of nearly the same thickness. Mesothorax without grooves. Petiole of abdomen very thick dilated below. Wings hyaline, but with a yellowish cast, very pubescent.

Hab.—Florida.

XCIV. *Basalys* Westwood.

141 (1). *Basalys ruficornis* Prov. Petite Faune Ent. du Canada, ii., p. 560. Hab. Canada.

XCV. *Glyptonota* Foerster.

XCVI. *Monelata* Foerster.

143 (1). *Monelata mellicoilis*, n. sp.

Female. Length .05 inch. Slender; head, thorax and abdomen polished black. Antennæ 13-jointed, honey-yellow; scape long, pedicel longer than first funicle joint, flagellar joints small, moniliform, terminal joint enormously enlarged or swollen, brown. Collar and legs honey-yellow. Mesopleuræ piceous. Mesoscutum without grooves. Wings hyaline, with long ciliæ.

XCVII. *Polypeza* Foerster.

Sub-family BELYTINÆ.

XCVIII. *Ismarus* Haliday.

XCIX. *Psilomma* Foerster.

144 (1). *Psilomma americana*, n. sp.

Male. Length .12 inch. Slender, black. Antennæ and legs honey-yellow. Antennæ 13-jointed, filiform, very long, reaching beyond tips of wings when folded, apical half dusky; the pedicel is annular, third joint excised outwardly half its length. Thorax sparsely pubescent, with two distinct grooves. Wings hyaline, veins brown; there is a basal cell and a small, closed triangular marginal cell, the radial vein projecting backwards to the middle of the wing.

Hab.—Florida.

C. *Oxylabis* Foerster.

CI. *Belyta* Jurine.

CII. *Synacra* Foerster.

CIII. *Pantolyta* Foerster.

CIV. *Zygota* Foerster.

CV. *Aclista* Foerster.
CVI. *Acropiesta* Foerster.
CVII. *Anectata* Foerster.

144 (1). *Anectata hirtifrons*, n. sp.

Female. Length .12 inch. Black, slightly pubescent. Face and cheeks covered with dense white pubescence. Antennæ 14-jointed, and when bent backwards reach to tip of abdomen; scape long, slightly bent or curved, pedicel annular, first five funicle joints longer than wide, following joints moniliform. Antennæ and legs rufous. Mesothorax with two grooves. Scutellum convex with a deep transverse groove at base. Abdominal petiole long, cylindrical, same thickness throughout. Wings hyaline, veins brown; the closed marginal cell is longer than the marginal vein.

Hab.—Canada. Described from one specimen kindly given me by Mr. W. H. Harrington, of Ottawa.

CVIII. *Pantoclis* Foerster.
CIX. *Macrorhynosis* Foerster.
CX. *Xenotoma* Foerster.

145 (1). *Xenotoma mellipes* Say (Cinctus). LeConte's Ed. Say's Works, p. 726.

Hab.—Indiana.

CXI. *Leptorhaptus* Foerster.
CXII. *Cinctus* Jurine.

146 (1). *Cinctus nasutus* Prov. Add. a la Faune Hym., p. 178.

Hab.—Canada.

CXIII. *Diphora* Foerster.
CXIV. *Zelotypa* Foerster.
CXV. *Miota* Foerster.

A NEW VARIETY OF PAPILIO AND A NEW CATOCALA FROM THE PACIFIC COAST.

BY JAMES BEHRENS.

I have received from Mr. Behrens, of San Francisco, the following descriptions for publication, and with them the specimens to which they refer. The *Papilio* is a very extraordinary aberration, probably owing

its color to a change in the food plant. I learn from Mr. Behrens that four specimens were obtained, all agreeing with each other. The Catocala is, I have no doubt, the form referred to by me (Pacific Coast Lepid., No. 14, Proc. Cal. Acad Sc., 1875) as having been seen by the late Baron Terloo at San Jose, Cal. I think it a good species, and in this view I am sustained by those excellent authorities on Catocala, the Rev. G. D. Hulst and Prof. G. H. French.

HY. EDWARDS. (New. York.)

PAPILIO RUTULUS, var. AMMONI, Behrens.—A very peculiar form, in which the ground color of all the wings is of a deep but rather dull orange color, and the bands and marks of the upper side all rather broader and more distinct than in the normal form. The orange color prevails also on the lower side, though a little mottled with lighter shades. Four specimens, male and female. Nevada. Taken by my friend, Herr v. Ammon, of San Francisco, in whose honor it is named.

CATOCALA ELDA, n. sp., Behrens.—Allied to *C. Relicta*, Walk., and more closely to its variety, *C. Phrynia*, Hy. Edw. It differs from this, however, by the superior wings being of one shade of grizzled gray, the whole surface covered with mottled scales obscuring all the lines except the t. p., which is straighter than in *C. Relicta*, and less deeply toothed. The orbicular is very large and distinct. The inferior wings are very much like those of *C. Relicta*, only the medium band is much narrower than in the Eastern species. On the under side the black band and discal spot are very distinct, black, and not shading into brown, as is usually the case with the common species. It is also smaller, the expanse of wings being only 68 mm., while that of *C. Relicta* averages 78 mm. Three examples. Portland, Oregon. Taken at the light of electric lamp.

CORRESPONDENCE.

Editor Can. Ent.: Allow me to correct two mistakes in my paper on the *Bombycidæ*, p. 156 *et seq.* of this volume. For "oval" p. 157, line 3, read "oral." For "North American," p. 159, line 17, read "American," as it is, indeed, evident from the context, that I wished to credit the *Ceratocampinæ* to both North and South America. It is, I believe,

absent from the West Indies, and the peculiar distribution of this subfamily has long engaged my attention. A. R. GROTE.

Bremen, Aug. 15, 1887.

Dear Sir: In reply to Mr. Henshaw's note as to *Carabus auratus*, I quote here Dr. Harris's words: "I have taken one specimen of this fine *Carabus* in Massachusetts and we have several *other* species which are equally predaceous," etc. (p. 72). There is not a word about the probable introduction of the specimen, and no reader could suppose that Dr. Harris thought it introduced. As it stands it is most certainly a "curious" identification, and seeing that Dr. Harris was by no means infallible (as seen in his describing *P. celeus* as *P. carolina* L.) it might be readily doubted. The italics *(other)* are mine, and certainly this word covers the origin of *C. auratus* in North America. In my paper I did not venture, nor intend, to do more than call attention to this remark of Dr. Harris's. If they shall have borne the fruit promised by Mr. Henshaw, my words will have been justified. But when *C. auratus* comes to be mentioned, it will be proper to state that Dr. Harris's reference to this species (House Report, April 1838, p. 72) is such a one that the reader must believe Dr. Harris regarded the European *C. auratus* as a Massachusetts species also.

The House, before whom Dr. Harris laid his Report, could come to no other conclusion from its language than that *Carabus auratus* was found in Massachusetts as well as in France. As to what Dr. Harris had then, or at a later date, affixed to the specimen in his collection, the House could have no knowledge and as little care. Dr. Harris's style is quite clear. It is not necessary to know German to understand his English. Therefore, on the whole, I was warranted in calling his identition as it stands, "curious." A. R. GROTE.

THE ANNUAL MEETING of the Society will be held on 26th and 27th October, at OTTAWA *(not London, as stated in our last number)*. Members are requested to bring with them, or send, papers to be read at the meetings. MSS. and specimens for exhibition or distribution may be sent to the care of Mr. Fletcher, Central Experimental Farm, Ottawa.

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COMPARATIVE TABLES FOR THE FAMILIES OF BUTTERFLIES.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

The need of a better knowledge of the actual structure of butterflies among those in this country who follow their study, is shown by the persistence with which an antiquated classification is adhered to,—a classification whose only value is historical, which conceals affinities and takes no account of the progress of investigation. In the hope of stimulating the examination of objects and not of books, the following Table for the determination of the four families of butterflies, originally prepared for my forthcoming work on the New England species, is here published. As will be seen, it includes in the analysis every stage of life, and while it intentionally oversteps the boundaries of New England in some respects, it does not, for the earlier stages, pretend to cover the outer field, excepting where it seemed important for some special purpose. Many of the characters here tabulated have never before been pointed out; others are the common property of science; that all characters are exhausted, or that some, and especially those drawn from the earlier stages, may not with increase of information require modification, is by no means maintained.

A. *Imago* of variable size, usually rather slender, with ample wings. Head in a vertical plane, the tongue being inserted opposite the lower half of the eye. Antennae approximate at the base, the space between them not equalling half the vertical diameter of the eye, the tip of the club rarely curved and never produced to a distinct point. Eyes with no overhanging pencil of bristly hairs, though in rare cases (some Lycaeninæ) a small tuft of hairs occurs at the base of the antennæ; cornea of eyes not extending over the posterior fourth of the ocellar globe. Front tibiæ rarely (Papilioninæ) with any epiphysis, and hind tibiæ with only terminal spurs. Inner edge of hind wings rarely (Papilioninæ) plaited, but

extending beneath and partially embracing the abdomen; fore and hind wings in repose resting in the same plane. *Egg* either distinctly higher than broad and then vertically ribbed; or sub-globular and then smooth or reticulate; or broader than high and then usually echinoid or tiarate. *Larva at birth.*—Head usually broader and higher than the body; the latter either with ranged appendages (of various shapes) generally longer, often much longer, than the segments; or with fleshy tubercles, especially on the thoracic segments. First thoracic segment with no distinct corneous dorsal shield. *Mature larva* variable in form, but generally cylindrical, often spinous, never with a strongly contracted and distinct neck, and without distinct thoracic shield. Generally constructing no place of concealment. *Chrysalis* generally (excl. Lycaenidæ) more or less angulate or with projecting shoulders, very rarely (in our species never) enclosed in a cocoon.

1. *Imago.*—Clypeus not only occupying the face, but extending also over half the crown of the head, and separated from the epicranium by a distinct (in Danais, slight) transverse furrow between the antennæ. Base of the antennæ wholly separate from the inner edges of the eye. Prothoracic lobes tolerably large and above tumid. Wings with the outer margins usually crenulate, dentate, sinuate, or angulate; front pair with two inferior subcostal nervules, originating at the extremity of the cell; inner margin of hind wing always embracing the abdomen. Tetrapod, the fore legs being unused and atrophied, especially in the ♂, but in both sexes the terminal appendages of the last tarsal joint absent (excepting in Libythea, where the claws are present in the ♀), and both spines and spurs of tibiae obsolete. *Egg* either reticulate and then sub-globular, or else vertically ribbed over at least the upper half of the egg, and then never more than one half as high again as broad. *Larva at birth.*—Head generally larger, never smaller, than the thoracic segments and generally scabrous; when of the same size, the corneous crown of the head is never encroached upon by the integument of the first thoracic segment, and the body is covered either with series of very long hairs (in which case most of them are acicular and not clubbed at the tip) or with extremely short and distant acicular hairs. *Mature larva* generally cylindrical, the head usually held in a vertical position, larger than the segments behind it, free and posteriorly contracted. Body

furnished with continuous rows of spines or smooth lenticular warts, or with discontinuous rows of fleshy tubercles, or with short pile; in the last case either the head is tuberculate or the last abdominal segment is furcate, or both. *Chrysalis* generally angulate, often strongly angulate, or if rounded, with shouldered prominences. It always hangs in a reversed position by its tail alone, except in the rare case of a few Satyrinæ, which are rounded, without special prominences, have no cremastral hooks, and undergo their changes in a crevice or a cell in the ground. Fam. I.—*Nymphalidæ.*

2. *Imago.*—Clypeus occupying but little more than the face and separated from the epicranium by a slight suture between the antennæ. Bases of antennae inserted in distinct sockets, which either clearly infringe on the inner edge of the eye, or are open next that edge. Prothoracic lobes minute, generally appressed to a mere lamina. Wings with the outer margin generally entire, especially in the fore wing, but the hind wing often tailed; fore wings with only one inferior subcostal nervule arising at the extremity of the cell; inner margin of hind wings generally but not always embracing the abdomen. Hexapod, the front legs being employed in walking, and not atrophied excepting in some males (Lycaenidæ, esp. Erycininæ), where they are partially atrophied, and sometimes have the tarsi reduced to a single unarmed joint. *Egg* either smooth, or else reticulate (and then tiarate or hemispherical), or else vertically ribbed (and then greatly elongated, nearly or quite twice as high as broad). *Larva at birth.*—Head always smaller or no larger than the thoracic segments and usually smooth; when of the same size, either the corneous portion of the crown is partially covered by the integument of the first thoracic segment, or the body is furnished with very long or very short hairs, almost all of which are clubbed at the tip. *Mature larva* cylindrical, or anteriorly enlarged, or onisciform. Head usually held in an oblique position, generally small, contractile and not free. Body never furnished with spines, but either naked, or furnished with discontinuous rows of tubercles (in which case the head is always smaller than the succeeding segments), or with short pile (when the head is uniform and the last abdominal segment entire), or with fascicles of longer hairs. *Chrysalis* angulate or rounded, often

with no prominences whatever. It hangs in various positions, but is always attached not only by its tail, but also by a silken girth around the middle, and in rare cases is also enclosed in a feeble silken cocoon. Some few tropical Erycininæ are said to lack the transverse girth.

a. *Imago* of small size and delicate structure. Front of head between the eyes much narrower than high. Eyes not projecting beyond the general contour of the head, notched on the inner margin, to give room for the antennal sockets. Antennae including the club straight. Metathorax only slightly separated from the mesothorax. Median cell of fore wings closed by a weak vein; median nervure of hind wings with three branches; the inner margin never plaited. Fore legs with no tibial epiphysis, sexually heteromorphous, the tarsi of the ♂ being more or less atrophied. Dorsal margin of the eighth abdominal segment of ♂ entire. Upper organ of ♂ genitalia with long, slender, strongly curved lateral appendages. *Egg* tiarate or hemispherical, and more or less deeply reticulate. *Larva at birth*, so far as known, furnished with numerous long, tapering hairs arranged in longitudinal series. *Mature larva*, so far as known, either onisciform or cylindrical; in the latter case the body is furnished with longitudinal series of fasciated hairs. *Chrysalis* usually short and stout, always bluntly rounded in front, the body rarely furnished with projections, and these invariably rounded. Median girth always close to the body at all points, the ventral surface of the body lying in a nearly uniform plane. Cremaster not at all or but slightly protuberant, the hooks inferior or apical. Fam. II. *Lycaenidæ* (Erycininæ + Lycaeninæ).

b. *Imago* of medium or large size. Front of head between the eyes as broad as high. Eyes prominent, not infringed upon by the antennal sockets. Antennae straight, or, especially the club, sinuate. Metathorax markedly separate from the mesothorax. Median cell of fore wings closed by a strong vein; median nervure of hind wing with three or four branches, the inner margin sometimes plaited. Fore legs of both sexes as complete as the other pairs, sometimes with an epiphysis on

the inner side of the tibiæ. Dorsal margin of the eighth abdominal segment of ♂ notched or produced to a hook. Upper organ of ♂ genitalia with no lateral processes. *Egg* subglobular and smooth, or very much elevated and longitudinally ribbed; (one known exception occurs in Parnassius, in which it is tiarate, but where, in contradistinction to the Lycaenidae, it appears to be overlaid with raised polygonal plates). *Larva at birth*, so far as known, furnished with longitudinal series of clubbed or forked hairs or with prickly tubercles. *Mature larva* cylindrical or enlarged anteriorly, covered with very short pile (in some exotic forms with long hairs), mostly arranged in transverse rows, or with rather infrequent and irregularly distributed minute hairs, and often also with series of fleshy tubercles or filaments or glabrous scarcely elevated warts. *Chrysalis* elongate, unimucronate or bimucronate in front, generally with numerous angular projections. Median girth frequently free from the body for a considerable part of its course by the ventral extension of the wing sheaths, the ventral surface of the body being generally bent near the middle. Cremaster strongly protuberant and free, the hooks apical. Fam. III. *Papilionidæ* (Pierinæ + Papilioninæ).

B. *Imago* of small or medium size, usually robust, with rather small wings. Head in a horizontal plane, the tongue being inserted opposite the middle of the eye or even higher. Antennae widely separated at the base, the space between them more than equalling half the vertical diameter of the eye, the tip of the club more or less distinctly pointed and recurved. Eyes usually overhung at the outer base of the antennae by a curving pencil of bristly hairs, the cornea extending over almost the entire ocellar globe. Almost invariably the front tibiae have a foliate epiphysis on the inner side, and the hind tibiae a middle pair of spurs in addition to the terminal pair. Inner edge of hind wings plaited, the fore and hind wings in repose often resting in different planes. *Egg* never noticeably higher than broad, hemispherical and smooth or domed and vertically ribbed. *Larva at birth.*—Head always broader and higher than the body, the latter with ranged fungiform appendages, never, excepting on the seventh and eighth abdominal segments, so long as the segments. First thoracic segment with a distinct corneous dorsal shield. *Mature larva* cylindrical but slightly flattened beneath and stoutest in the middle,

never spinous, generally minutely and coarsely pilose, with a large head, slender neck, and a transverse corneous shield on the upper surface of the first thoracic segment. Always living in concealment. *Chrysalis* smooth and uniform, rarely with a mucronate head, always enclosed in some sort of a cocoon. Fam. IV. *Hesperidæ.*

THE NUPTIALS OF THALESSA.

BY W. HAGUE HARRINGTON, OTTAWA.

For several years I have observed with much interest the oviposition of our large and handsome "long-stings," but not until this summer have I been able to witness their actions preparatory to this duty. Although the males are frequently numerous when the females are ovipositing, the sexes pay no attention to one another, and this fact led me frequently to wonder at what time mating occurs. Last year I had, in company with Mr. Fletcher, observed the males in strange positions, with the tip of the abdomen applied to the bark, or inserted in a crevice, and had suggested that they were awaiting the emergence of the female. The supposition was, however, not proven, and the actions observed were still a matter of conjecture, and for further observation.

On the afternoon of the 7th June last, I visited some old maples *(Acer saccharinum)* for the special purpose of making observations on *Oryssus*. The trees are in different stages of disease and decay, and are correspondingly infested by such borers as *Dicerca divaricata*, *Tremex columba*, *Xiphydria albicornis*, *Oryssus Sayi*, etc., while they attract naturally numbers of our larger Pimplidæ, such as *Thalessa*, *Xorides*, *Ephialtes* and *Xylonomus*. Upon these trees during their season could generally be found many specimens of *Thalessa*, but I had never seen one emerge from its prison into the warmth and light of its adult existence. Upon a tree which for years had been much bored by *Tremex*, etc., I, upon the above date, saw several specimens of *T. atrata* and *T. lunator* ovipositing, and at some distance below them a group of males in an evident state of excitement. Three of these had their abdomens inserted more than half way under a flake of bark. Here, I congratulated myself, was an opportunity to ascertain whether a female was about to emerge. With my knife I pried off the piece of bark, and beheld the head of an

insect just appearing through the wood. The males had flown away when disturbed, and I was afraid that they might not return before the female emerged, but two came swiftly back and commenced to pay her attentions before much more than her head was visible. As soon as she was out of the burrow she was embraced by one, and copulation apparently followed, but did not last long, as she began to crawl up the trunk, and when I interfered to prevent her getting out of sight, the male flew away. However another was ready to take his place, and the pair were almost instantly *in coitu*. A few seconds later the female attempted to fly, and fell to the ground; the male disengaged himself and flew away, and his partner then did the same, starting with a strong and rapid flight.

Visiting another tree not many paces distant, I saw a group of more than a dozen males of *lunator* in very evident anxiety and excitement, their long antennae quivering, and their whole demeanor evidencing some powerful emotion. I peeled off a piece of bark at the centre of attraction, but found no sign of any insect coming forth. An hour or so later, when returning from my ramble, the group was even larger, and several were probing a crevice within an inch of the space from which I had stripped the bark. Thinking that the female might be here, I cut off another piece of bark, but could find no signs of her, although the males were so excited as even to settle on my hands.

Proceeding to the tree from which I had previously seen a female emerge, I found several males clustered about three inches from where she had come out. Two had the abdomen flexed and the tip inserted in a small aperture in the bark. Stripping off this fragment of bark, I found that a female was there, and had gnawed her passage so nearly through the bark as to have pierced the surface. The males fluttered excitedly around, and, as in the first instance, she was embraced before she had wholly emerged, and copulation was effected as soon as she was out. Being in a hurry, and wishing to preserve the specimens, I boxed them, the other males flying around me in great excitement until this was achieved.

Two days later I was able to visit the same locality for the purpose of making further observations on these insects. On tree number one I saw at some distance up the trunk a small cluster of expectant males. By standing on the top of a dilapidated and shaky fence, I was just able to reach the spot and with my knife remove the covering of bark As my position was too precarious for comfortable observation, I secured the

female as she emerged and carried her to another tree upon which were some males. As soon as she commenced to crawl up the trunk, she was eagerly followed and embraced by one of the more active males. Copulation took place with four different males—the female falling to the ground on each occasion, and being again seized as she crawled up—the last union continuing 2½ minutes, after which she flew away unattended.

On proceeding to tree number two, I found a very large and strongly excited cluster of the males in the immediate vicinity of the spot from which I had cut the bark on the former day. They were about twenty in number, and were packed so closely together that those in the centre could scarcely be seen. Like the inmates of a burning theatre, they trampled over one another in their excitement. Displacing them with some difficulty, I hewed off a slice of bark and revealed the female cutting her way to a new life, her head being partially visible. Her ardent admirers immediately swarmed around and endeavored to get their abdomens down the burrow, an undertaking in which they impeded one another so greatly that the only result was wedging the female in and preventing her from emerging. The cluster was soon so dense that she was entirely hidden, and as there seemed no prospect of her getting out for some time under the circumstances, I began to drive off, or rather to forcibly remove one by one, her besiegers. After nearly all were removed, I saw that one of the few remaining had his abdomen inserted its full length in the burrow. As the female was still unable to emerge, I drove off the remaining males, and as soon as the way was clear she came rapidly out. There was instantly fierce rivalry for her favors, but eventually one stronger, or more agile, than his fellows, succeeded in his desires, the pair remaining about 1½ minutes *in coitu*, after which the female ceased apparently to have further attractions.

The foregoing notes (written upon the second date of observation) show that the males are able to determine where a female is making her way outward—some time, perhaps, as in the last case recorded, many hours before she appears. Whether this is ascertained by the sense of hearing or smell, or a combination of both, I do not attempt to say, but the antennæ are evidently largely used in locating her, as may be readily seen by the way in which the bark is examined with them. When there is a crevice or aperture, the male bends his abdomen—at the suture between first and second segments—until it is at right angles to the thorax, and endeavors to insert it in the said crevice or aperture. He has

then the attitude of a female insect ovipositing. As has been mentioned, if the hole is large enough the abdomen will be fully inserted, and it is perhaps possible that copulation may take place while the female is yet in the burrow. On emergence she is instantly seized, the legs of the male clasping the yet unfolded wings with the abdomen, and thus preventing her from flying. From the large number of males always about at this season, it is probable that the female seldom, if ever, emerges unattended. After the very brief honeymoon, she is no longer an attraction to the opposite sex, and is able to proceed unmolested with her work of depositing the germs of a future generation. I may add that of the pair confined by me the male died the same or following day, while the female was strong and vigorous until she unadvisedly entered a cyanide bottle.

STRAY NOTES ON MYRMELEONIDÆ, PART 3.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

(Continued from page 156.)

The following species are very interesting, as they possess no spurs at the end of the tibiæ. From N. America are four species, two not yet described. All agree in the following characters: They are very slender, more or less hairy or villous; head small, narrow; antennæ long, as long as head and thorax, or at least prothorax, stout, cylindrical, becoming gradually thicker but not clavate; labial palpi a little longer than the maxillary ones; last joint very little thickened to the middle, where a superior depression makes the apical half about cylindrical; legs short, not very thick, with numerous spines and bristles, but no spurs; first joint of tarsi longer than the following, but shorter than the apical one; abdomen of male considerably longer, of female shorter than the wings; appendages of male short approximate, cylindrical with strong hairs and spines, enlarged at the base to reach the dorsum of abdomen; between them below a very small triangular plate; female with two short flat appendages inferiorly; upper part rounded, split in the middle; wings elongate, narrow, enlarged to the bluntly pointed tip; post-costa oblique; venation dense, and sprinkled more or less with brown; costal space of front wings with two series of areoles (one species) or with one series, but the transversals in the apical half (or less) forked; at the extreme

base of the hind wings of the male is a small white free knob, homologous to the larger and darker knob of Palpares and Acanthaclisis. The larva of one species is known; it differs from all others and was described by me as perhaps belonging to *Acanthaclisis congener*.

Mr. McLachlan has described the female of a species from Turkestan as a new genus, *Maracanda amoena*, which has the same characters as the N. American species, with one series of areoles in the costal space of the front wings. The only exception is that the apical joint of the labial palpi are said to be very much dilated, what is not to be found in the N. American species. I do not know *M. amoena*, but I should think that its difference from *M. imbecillus* Stein., from Greece, should be proved. *M. conspurcatus* Kolenati, from the same locality with *M. amoena*, can not belong to *Creagris plumbeus*, where it is quoted by Brauer and McLachlan, as its size is by far too small and only very little larger than *amoena*. I can not compare the two Australian species, said to have no spurs.

I possess a couple of *M. imbecillus* Stein (Berl. Ent. Zeit., vii., p. 421) from Montenegro, Europe, which agrees entirely with *M. amoena*, and can not be identified with any other described species. The legs have no spurs,* contrary to Stein's description, but bristles, yellowish-brown, straight, half shorter than the basal joint. After this rather long preamble, I come to the question if perhaps some Myrmeleon, just as among Phryganids some Limnophilids have spurs which can be wanting or aborted, at least on the fore legs.

There are a number of N. American Myrmeleon, *M. longicaudus*, *M. ferus*, *M. nebulosus* and others, which nobody would separate from *M. conspersus*, except by the presence of spurs. Some have two series of areoles in the costal space, and some only one series, as in *Maracanda*. Nevertheless none of the seventeen *M. conspersa* before me has a spur, and none of the six *M. longicaudus* and the six *M. contaminatus* lacks spurs. Therefore I have the species without spurs described as belonging to *Maracanda*, and propose provisionally for the other a new genus, *Brachynemurus*.

Maracanda, McLachlan.

This new genus is described in A. Fedtschenko's Voyage in Turkestan, vol. ii., 5, Moscow, 1875. The largest part is in the Russian language. As the N. American species without spurs at the tips of the tibiae must

* Mr. H. J. Kolbe, Assistant of the Berlin Museum, has kindly compared Stein's type and confirms my statement.

be compared with this genus, and as only one Entomologist in the U. S. reads Russian, I give here a translation (by Prof. J. D. Whitney, in Cambridge, Mass.).

Maracanda, nov. gen.

Tibiae hand calcaratae. Antennae breves, robustae, clava elongata. Palpi breves, labiales articulo ultimo valde dilatato. Pedes breviusculi, tarsorum articulo primo multo longiori quam secundus, sed breviori quam ultimus. Abdomen alis brevius. Alae elongatae, angustatae, post-costa obliqua; alae posticae anticis paulo breviores; femina.

This genus, by the want of the spurs on the tibiae, is related to *Gymnocnemia*. The short, thick antennae, the construction of the palpi, however, make it impossible to put the species described below in the same genus with *G. variegata*, the typical species of the genus *Gymnocnemia*.

Remark.—*Myrmeleon occultus* Walk. and *M. malus* Walk., from Australia, also do not have spurs on the tibiae (in the description of these species, however, this peculiarity is not mentioned). It is very probable that both these species ought to be included in the genus *Maracanda*.

1. *Maracanda amoena*, McLachl., n. sp., p. 2, pl. i., fig. 1.

Pallide flava. Antennae brunneae, vix pallido-cinctae. Caput thoraxque lineis tribus longitudinalibus fusco-nigris supra signata. Abdomen nigrum vel fuscum, utrinque et infra flavo-lineatum. Pedes flavi, femoribus extra nigris, tibiis in medio et ad apicem nigris, articulisque tarsorum ad apices nigris. Alae albido-hyalinae, punctis plurimis (praecipae apicem versus) nigris conspersae, venis venulisque albidis, nigrostriatis, pterostigmate nigro-signato, femina.

Long. corp. circ. 15 m.m.; exp. alar. 34 to 40 m.m.

Habitat in deserto Kisil-kum; five specimens were collected May 12, 1871, in the region of sand-hills about 10 versts west of Djusebai Springs.

Antennae longer than the head and the front part of the thorax, gradually passing into a thick elongated clavate form, cinnamon colored with the exception of the basal joint; the cinnamon color of the remainder of the joints passes with a whitish color on the articulations; the body is bright yellow. The head has above three small elongated dusty lines, which unite with each other in front; on the side from the end of these dark spots there extends a single dusty transversal line; a single knotted line of the same color is seen on each of the antennæ; finally a single elongated dusky line extends along the front of the head. The labrum is

not long, but rounded on the front margin ; the labial palpi are somewhat longer than the maxillary, with the terminal joint much broadened, pointed, outside with a dark, large shining spot. The prothorax has parallel margins, and above three long, black or dusty lines, equally distant from each other. On the meso- and metathorax these lines are separated with distinct spots, among which appear a few small black lines and spots ; upon the side of the thorax two dark lines are seen on each side. Legs short and not very thick, bright yellow, covered with shining hairs ; on the outer side of each femur a dusty or reddish line ; each tibia is surrounded in the middle with a dark ring, frequently wanting in the posterior tibiæ. The abdomen is almost entirely black or dusty, with broad yellow rings on the sides and lower surface ; at the extremity of the abdomen are found two broad triangular plates, rounded off towards the end, approximate, surrounded internally with black bristles and covered externally with black hairs ; under these plates are placed two auxiliary palpi, one under each plate, the lower half of the following abdominal segment deeply cleft in the middle, and with a lengthened fringe joins a long cylindrical growth. The wings are long and narrow, the posteriors somewhat narrower and shorter than the anterior pair, whitish transparent, sprinkled with a great number of delicate black spots, particularly thickly grouped along the radius and the inner margin of the wings, and form an almost unbroken line along the outer series of gradate veinlets. The venation is very open (few transversal veins) ; the veins are pale whitish or whitish yellow, over the greatest part on the minute black spots ; the posterior wings have dark lines and spots in a small number; pterostigma whitish and black internally. (McLachlan.)

Of course I am unable to decide if the Russian translation of the English original is exact ; at least only in one place (genitals of female) I find some difficulty in understanding it.

2. *Maracanda conspersa*, Rbr.
M. conspersus, Rbr., 327, 3—Walk., 329, 47.

Body hairy, black, with whitish spots, very slender ; head small, face pale, above with a broad transversal blackish band, in which the antennæ are inserted ; this band is excised below in middle ; before the labrum on each side a brownish spot ; vertex cut straight in front, very little notched in middle, black, with a faint yellow lateral dot ; before the vertex a transversal pale band ; antennæ long, 7 m.m., strong, cylindrical, a little thicker

to the tip, which is bluntly pointed but not clavate; black, very faintly annulated with pale on a few basal segments; maxillary palpi short, brown, or blackish brown, base of cylindrical joints pale, last joint very little incurved, cut at tip, as long as 3rd and 4th together, 3rd a little longer than 4th, thicker on tip.

Labial palpi a little longer, basal joint pale; second longer, enlarged to tip, a little incurved; last joint longer, thicker to middle, above depressed, cylindrical, tip blunt; both joints blackish, pale on articulation.

Prothorax short, before the middle a transversal flat furrow, front margin slightly rounded; black with three yellow dots anteriorly and a posterior stripe on each side; with some white hairs, intermixed with black ones; mesothorax dull brownish gray, with a few scattered white hairs, two yellow dots anteriorly and four in a transversal series in the middle; the conical suture ending in the posterior margin pale yellow with a middle dagger-shaped black line, and on each side a shorter black line; in front of it two globular black shining elevations, which are approximate and like two ocelli; metathorax similar with some yellow spots.

Abdomen (male) longer than the wings, very slender, about cylindrical, blackish hirsute; brown, shining, darker below and at the apex; segments 2 to 4 with two pale dorsal longitudinal lines, which are sometimes partly confluent; the two following segments with two pale spots in middle; appendages brown, clothed densely with black hairs, straight, the base triangularly dilated to reach the dorsum of the segment; shorter than the last segment. Abdomen (female) much shorter than the wings, less slender, apical half thicker; color similar, but the long pale dorsal lines represented only by two middle and two apical spots; genital parts in the last segment with many strong black spines; upper part divided in two pale tubercles; below with two short brown appendages.

Legs short, pale, with white hairs, intermixed with a few black ones, principally at tip, densely sprinkled with black, the femurs sometimes nearly blackish; tip of tibia black; tarsi with apex of the two basal joints, the two following entirely, and tip of fifth, black; claws long, incurved, brown; spurs wanting.

Wings short, broadest before the bluntly-pointed apex; hyaline with white shades, a little fumose, the anteriors closely sprinkled with fuscous; venation dense, veins fuscous interrupted with white; around the transversals after the mediana and after the 4th vein, brown shades, sometimes forming brown streaks on the disk and near the hind margin; two series

of areoles in the costal space except near the base; hind wings less spotted.

Length of body, male, 32 to 44 m.m.; female, 21 to 27 m.m. Exp. al. 42 to 60 m.m.

Habitat.—I have before me 8 males and 9 females. From Canada; Upper Wisconsin River, Kennicott; from Hamilton, Ontario, Moffat; Michigan, a couple in alcohol, Capt. Meade; Ludington, Mich., Pierce; Port Huron, Mich., Hubbard; from New Jersey, Uhler; from S. Carolina, Zimmerman, the type of *M. Talpinus* Klug.; from Savannah, Ga., the type of *M. irroratus* Burm., vol. ii., p. 995, No. 11, with the label in Burmeister's hand-writing; from Millin, Scriven Co., Ga., July, by Morrison; from Florida, Norton.

The range of the species is very large; the largest specimens are from Canada and Michigan, the smallest from Georgia. The wings are more or less sprinkled.

The species has been raised from a larva which I had supposed to belong to *Acanthaclisis congener*, but Mr. Redtenbacher rightly doubted my determination. I have besides the described larva from Wyoming before me, one from Port Huron, Mich., and one from Crescent City, Fla., both collected by Mr. Hubbard. I can not find any difference between them and a larva from Ludington, Mich., by Mr. Pierce, who intends to describe the full history of the species raised by himself.

When I was still in Europe, I had determined "with some doubt" this species as the *M. abdominalis* Say. The large material now at hand has shown me years ago that Say's species is a different one. As there exist before Burmeister two different *M. irroratus*, Rambur's name has the priority; his type is a female. The *M. irroratum* Oliv., Encycl., viii., p. 126, No. 30 (copied by Walk., p. 408, No. 207), from Italy and Greek Archipel., is probably *M. imbecillus* Stein. The *M. irroratus* Klug., Symb., pl. 35, f. 6, from Arabia Felix, has visible spurs. The type is in the Berlin Mus.; I can not determine the species, but believe it is not a *Creagris*. After Mr. Taschenberg, there can be no doubt that the type of Burmeister of his *M. irroratus* in the Halle Museum, is different from his type in Winthem's Coll. The type in the Halle Museum is *M. longicaudus* Burmeister, after his type in Winthem's Coll. *M. contaminatus* Burm. is the female of *irroratus* type (in Winthem's Coll.); Mr. Taschenberg's description is conclusive. *M. nebulosum* Oliv., Enc. Meth., viii., 127, 35, from New York, is *M. conspersus* Rbr.; the description of

the color of abdomen excludes the other related species. *Myrm. contaminatus* was mentioned in a note to *M. irroratus* Burm., ii, 995, 11. The probable type was described in Giebel Zeits., vol. 52, 214, 30.

3. *Macaranda signata* Hag.

Body hairy, yellow, striped with brown; not very slender. Head small, face yellow, eyes margined with bright yellow, which is followed inside by a black line in the groove and another median one; antennæ brown with a bright yellow ring, followed on the face by a brown triangular spot; vertex elevated; its front margin notched in middle and on each side; above dark brown, sides and occiput largely yellow, also two transverse interrupted bands; a pale transversal band before the vertex, separated from the antennæ by a narrow brown one; maxillary and labial palpi as in *M. conspersus*, yellow, apical joint light brown; prothorax yellow, above with a broad brown band with a fine yellow median line and a yellow stripe on each side; sides whitish-villous; thorax yellowish with brown stripes, the pattern similar to *M. conspersa*. Abdomen of male about as long as the wings, less slender, whitish-villous, yellow, very finely sprinkled with blackish dots; sides and apex blackish-brown; a fine black median line on 3rd and 4th segments; appendages as in *M. conspersa;* abdomen of female much shorter than the wings, black, the apical half with some ill-defined yellow marks on the sides and tip of segments; legs in shape and color as in *M. conspersa*, but joints 3 and 4 black only on tip. The genitals are light brown, similar to *conspersa*.

Wings hyaline, not sprinkled; veins brown, interrupted with yellow; pterostigma yellow, faintly darker inside; venation as in *conspersa*, with the important exception that the costal space of front wings has only one series of areoles; the transversals in the apical half of the wing are forked.

Length of body, male, 27 m.m.; female, 21 m.m. Exp. al., 46 m.m.

Hab.—A female, fully developed, from White Fish Point, Lake Superior, by Mr. Hubbard, but the yellow color of the body is more slate color. Ludington, Mich., Mr. Pierce. The couple before me, in bad condition, were sent in 1881; later, when Mr. Pierce worked here, these specimens were mislaid and only turned up now. I am certain that this species was not among the specimens brought over with him. The male apparently has been transformed only a short time ago, therefore it can be presumed that its abdomen has not attained its full length.

4. *Maracanda Henshawi* Hag.

Body very slender, hairy, striped with yellow. Head very small; face yellow, black near antennæ; two small black dots on each side and one in middle; antennæ longer than head and prothorax, stout, cylindrical, tip narrowed; black, the basal joint and the articulations yellow; maxillary palpi pale with a brownish tinge, apical joint brownish; labial palpi white, apical joint after basal third dark brown; vertex elevated, black anteriorly, with a thin silvery felt; above yellow with two transversal black lines and some spots near occiput; prothorax black, a fine yellow median line and a yellow dot each side of the line near the front margin; sides largely yellow, with a blackish stripe; mesothorax black, anteriorly with two narrow lines, followed by a median one and two faint lines on each side, all yellow; metathorax black with a yellow cross of spots and lines; sides of thorax black, with two yellow lines; abdomen very slender, black, segments 2 to 6 with a dorsal yellow band, split by a faint black median line; appendages short, straight, cylindrical, brown, with a brush of black hairs; base going upward to dorsum; below between them a small black triangular plate, with yellow tip; legs short, thin, pale, femur externally black; tibiæ with white hairs, and some black bristles around tip; four anterior tibiæ sprinkled with black externally; tip of all, and tip of joints of tarsi black, more on last joint; no spurs; claws incurved, reddish-brown. Wings hyaline, narrow; costal space with one series of areoles and the transversals in the apical fourth of wing forked; veins brown interrupted with yellow; pterostigma small, yellow, with a blackish spot internally; wings very little sprinkled; along the anterior longitudinal veins the transversals shaded with brown; front wings with an oblique dark stripe parallel to the hind margin of the apex; hind wings less sprinkled along the anterior longitudinal veins.

Length of body 30 m.m.; exp. al., 40 m.m.

Habit.—Umatilla, Oregon; one male, June 24, 1882, collected by Mr. S. Henshaw.

This species is directly separated from the two foregoing by its small size, and by anterior face of the vertex being black.

5. *Maracanda? pygmaea* Hag.

Myrmeleon pygmaeus Hag., Syn. N. Am. Neur., p. 231, No. 13.

The type collected in Mexico by Mr. Deppe is in the Berlin Museum. Not knowing anything more about this smallest described species than

what is given in the Synopsis, I have not re-copied my description. The species arrived just in the last moment, when my manuscript was to be sent to Washington, therefore I have not given more details. The characters quoted—antennæ short, club large, almost orbicular; wings short the apex very much dilated; the venation peculiar, simple—make it doubtful if *M. ? pygmaea* belongs to this genus.

FURTHER INJURY TO LIVING PLANTS BY WHITE ANTS.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

More than twenty-five years since (Proc. Boston Soc. Nat. Hist., v. 7, p. 287-288) I published an account of serious injury to living grape-vines in hot-houses in Salem, Mass., by our common species of white ants. *Termes flavipes.* No further notice of their injury to living vegetation appears to have been taken until a few years ago, when Prof. J. H. Comstock, then government entomologist, stated (Rep. Comm. Agric., 1879, 207-8) that they had been found in Texas and Florida "girdling the bark of orange trees and guava bushes near the surface of the ground, or eating out the interior of sugar-cane and other plants." "When white ants infest living plants," the report goes on to state, "they attack that part which is at or just below the surface of the ground. In the case of pampas grass, the base of the stalk is hollowed; with woody plants, as orange trees and guava bushes, the bark of the base of the trunk is eaten, and frequently the tree is completely girdled; with sugar-cane the most serious injury is the destruction of the seed cane."

Still more recently, Dr. H. A. Hagen published in the CANADIAN ENTOMOLOGIST (v. 17, p. 134-136) another instance here in Cambridge where living maple trees were largely infested by them, though the ants appeared to have done little damage, the trees being "apparently in good condition," but one of them being felled it was found that for a couple of feet above the ground, to the depth of an inch from the surface, the trunk was extensively burrowed by the white ants.

In this same article, after referring to the injury reported from Salem, Dr. Hagen adds: "The earth in the hot-houses here in Cambridge is largely infested by white ants, but as far as I know, no destruction of

plants has been observed." This is no longer true, for in the autumn of 1886 I was asked to look at the green-house connected with Mt. Auburn Cemetery, to see if anything could be done to prevent the loss of geranium cuttings by an insect, which turned out to be the same culprit. The bed in which the cuttings were set was a long shallow wooden box or tray placed against the northern wall of the green-house; the tray was filled with moistened sand and kept constantly warm by being directly over a chamber heated by hot-water pipes. The ants thus found the precise condition which they prefer, warm moisture, and the wooden sides of the tray showed everywhere the characteristic gauges of the insect. The geranium cuttings were plunged near together in the sand, and the ants entering at the cut end had eaten out everything but the rind, and by the time they had penetrated the cutting above the level of the sand, the drooping leaves gave sign of the injury to the plant. Some, the leaves of which had begun to turn black, were found to have been eaten to the very bases of the terminal leaves, and a good deal of injury had been done, hundreds of cuttings having been destroyed; the trouble had been going on, I was told, for a year. As a light porous soil is required for the culture of the cuttings, and a receptacle allowing the passage of the water with a certain freedom, I recommended that the bottom of the tray be made of slate or tiles of the material from which flower pots are made, and the sides of zinc or other metal, high enough to come several inches above the sand.

ON COLIAS ERIPHYLE Edw., AND C. HAGENII Edw.

BY W. H. EDWARDS, COALBURGH, W. VA.

In my last paper I showed that *C. Hagenii* was a yellow form of *C. Eurytheme* Bois., and I am now prepared to say that *Hagenii* is identical with *Eriphyle*, and the name gives way to this. I described *Eriphyle*, Tr. Am. Ent. Soc., v., 202, 1876, from about thirty individuals of both sexes, taken in British Columbia, at Lake Lahache, by the late G. R. Crotch; and related that they were submitted to Mr. Henry Edwards, who pronounced them distinct from any of the Pacific coast species, an opinion with which I agreed. I said they came nearest *Philodice*, and pointed out the differences, which seemed to be decisive against their being of that

species; and concluded thus: "Mr. Mead brought from Colorado, in 1871, a Colias very close to this from Lake Lahache, and which in Reakirt's paper on the Butterflies of Colorado (Pr. Ent. Soc. Phil., 1867, p. 14) is doubtless the one called *Philodice*. The same form was brought from Montana, by Dr. E. Coues, when engaged in the Boundary Line Commission. For the present I shall give no opinion as to these, but they seem to me nearer *Eriphyle* than to *Philodice*." In this last expression I was right. The under sides of the *Eriphyle* were quite free from markings, sometimes completely so, except the discal spots, but some examples showed more or less of the sub-marginal spots and the other patches which are found in both *Philodice* and *Eurytheme* Now on comparing the 12 examples of *Eriphyle* still remaining in my collection with examples of *Hagenii*, there is no doubt of the identity of the two. I can match every *Eriphyle* by a *Hagenii* in either sex. The name *Hagenii* therefore is sunk, and this form will be known in future as Colias EURYTHEME, tetramorphic form ERIPHYLE (pronounced E-riph'-y-le).

The following letter, referring to above, is of importance as showing that twice Mr. Edwards came to the same conclusion independently concerning this species.—EDITOR, per J. F.

Coalburgh, W. Va., 24th Oct., 1887.

The Editor Canadian Entomologist:

MY DEAR SIR.—To-day, in clearing some loaded shelves, I came on a bundle of Dr. Coues' Reports "On the Collections of Insects made by Dr. Elliott Coues, U. S. A., in Dakotah and Montana, during 1873 and 1874"—Washington, 1878; of which I supplied the paper on Lepidoptera. And to my surprise, for I had quite forgotten particulars of the paper, not having looked at it for years, I find that I therein named the Colorado Colias, afterwards called *Hagenii*, as ERIPHYLE. The paper was written several years before it was printed, so that this description of *Eriphyle* really preceded the one printed 1876, Tr. A. E. Soc., and is headed Colias *Eriphyle* Edw., new species. After describing it I added these lines:

"I first received examples of this species from Mr. T. L. Mead, who took them in Colorado, in 1871, and was disposed to regard them as a variety of *Philodice*. Subsequently I received about 50 specimens, taken by the late G. R. Crotch, in British Columbia, and later, 1874, several specimens, which were taken by Mr. Pywell on the line of the Northern

Pacific Railroad west of Bismarck. This material enables me to judge with confidence of the distinctness of this species. It is not, in my opinion, a variety of *Philodice*, nor is it *Occidentalis*, Scudder, to which it bears some resemblance."

This paper is not referred to in my Catalogue of 1874.

NOTE ON SOUTHERN MOTHS FOUND IN THE NORTH.

BY A. R. GROTE, A. M.

Not unfrequently do I read of the capture of Southern *Noctuidæ* found in Canada and the Northern United States, with the added remark that the specimen was so fresh that it must have just escaped from chrysalis. These remarks are made while I am always (for ten or fifteen years past) saying that these are wind visitors, immigrants. So lately of *Erebus odora*. Now were this moth really found here as a larva, its large Catocaline caterpillar must have been found. It is improbable that the food plant of *odora* grows in the North. The scales are strongly adherent in all these *Noctuidæ fasciatæ;* the "fresh" moth has flown a thousand miles, more or less, according to my theory, which I seem to support alone, and of which then nobody can rob me. In fact I would rather be wrong, because then my ideas are not appropriated. Hübner has a weakness for considering the *Noctuidæ fasciatæ*, Geometers; so *Ptichodis bistrigata* (CAN. ENT., 12, 87), *Eulepidotis alabastriaria* (not known to me), *Crochiphora flavistriaria* (CAN. ENT., 12, 118) and others. Knowing *Brotis vulneraria* only from figures, I think it is a Noctuid and a wanderer from the South. *Erebus odora* may breed in Florida, in Texas, New Mexico, So. Colorado, but not with us. This is my theory of immigration from the South; no other writer agrees to it or advocates it. Right or wrong, it is my own. The great question with these species is the limit of successful hibernation, continuous residence, breeding. The Northern food plant must be produced by my opponents.

CHANGE OF ADDRESS.—Miss Eleanor A. Ormerod, from Dunster Lodge, Spring Grove, Isleworth, to Torrington House, Holywell Hill, St. Albans, England.

Mailed November 1st.

The Canadian Entomologist.

VOL. XIX. LONDON, DECEMBER, 1887. No. 12

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held pursuant to notice at Ottawa, on Wednesday and Thursday, 26th and 27th October, 1887. The meeting was held in Ottawa at the request of several members, in order that an opportunity might be afforded to visit the Central Experimental Farm of the Dominion Government, to examine the valuable collections of insects in the Museum of the Geological and Natural History Survey of Canada, and to inspect the collections of the members resident in Ottawa. Through the kindness of the civic rulers, the meetings were held in the City Hall.

A Council meeting was held on Wednesday, at 10 a. m., on the adjournment of which the Museum was visited and the insect collections examined, the magnificent exhibit of Lepidoptera eliciting universal admiration.

In the afternoon the Experimental Farm was visited, the Director, Prof. Saunders, kindly placing carriages at the disposal of the Council. A Council meeting was held in his office, after which he escorted the visitors around the farm, and explained the work already accomplished, and the plans for future operations. The house and barns in course of construction were justly admired, and it was evident to all that a great and useful work was being accomplished under the oversight of the Director and his skilful assistants.

In the evening a general meeting of the Society was held in the council chamber of the City Hall, and the Annual Address was delivered by the President, Mr. James Fletcher. Among the large audience present were, in addition to members of the Entomological Society, many officers and members of the Ottawa Field Naturalists' Club, of the Ottawa Literary and Scientific Society, of the Geological Museum, of various educational institutions, agricultural associations, etc., as well as gardeners and farmers from the surrounding country.

The address was a very instructive and practical one, and was listened to with great attention and interest by all present. It gave a sketch of the growth of the Society, and an outline of the work being done and to be carried on at the Government Experimental Farms. The value of Natural Sciences as a training for the mental faculties and the co-relationship of the different branches was shown. The latter portion consisted of a report on the insect injuries for the year and the broad general principles regulating the application of remedies. On its conclusion a vote of thanks to the President was moved by Rev. C. J. S. Bethune, who described the work being accomplished in England by Miss Ormerod, and illustrated it by an account of her exertions to ward off the attack of the Hessian Fly. The vote of thanks was seconded by Prof. Saunders, who confirmed the statements made in the address, and gave accounts of some experiments with solutions of Paris green as a preventive of Curculio in plums, and Codling Moth in apples. The President's address will appear *in extenso* in the Annual Report.

A collection of Coleoptera captured in the vicinity of Ottawa was exhibited by Mr. W. Hague Harrington. It was arranged in 18 cases and contained about 1,250 species.

The annual meeting of the Society for the election of officers, etc., was held at 11 a. m on Thursday, in a committee room of the City Hall.

The President, Mr. James Fletcher, occupied the chair, and the following members of the Council were among those present: Rev. C. J. S. Bethune, Port Hope; Mr. J. Alston Moffat, Hamilton; Mr. J. M. Denton, London; and Mr. W. H. Harrington, Ottawa.

The minutes of the previous meeting having been printed and circulated amongst the members, their reading was dispensed with, and they were duly confirmed.

Mr. W. H. Harrington was requested to act as Secretary in the absence of that officer.

Letters were received from Rev. T. W. Fyles, Quebec; Mr. E. Baynes Reed, London; Mr. H. H. Lyman, Montreal; Mr. W. E. Saunders, London; Mr. J. D. Evans, Trenton; Capt. Gamble Geddes, Toronto, and others, announcing their regret at being unable to be present.

The Report of the Council was read by Rev. C. J. S. Bethune, and on motion of Mr. Denton, seconded by Mr. Moffat, it was duly adopted.

The statement of the Secretary-Treasurer (balance sheet) was received and adopted.

The Reports of the Montreal Branch, and of the Delegate to the Royal Society of Canada, were received and referred for publication.

The election of officers was then proceeded with, and the following gentlemen were duly and unanimously elected :

President—James Fletcher, Ottawa.

Vice-President—E. Baynes Reed, London.

Secretary-Treasurer—W. E. Saunders, London.

Librarian and Curator—E. Baynes Reed, London.

Council—W. Hague Harrington, Ottawa ; Rev. T. W. Fyles, Quebec ; J. Alston Moffat, Hamilton ; J. M. Denton, London ; Rev. Geo. W. Taylor, Victoria, B. C.

Editor "Canadian Entomologist"—Rev. C. J. S. Bethune, Port Hope.

Editing Committee—Prof. W. Saunders, Ottawa ; J. M. Denton, London ; Dr. Wm. Brodie, and Capt. Gamble Geddes, Toronto.

Auditors—J. M. Denton and E. Baynes Reed, London.

Delegate to Royal Society—H. H. Lyman, Montreal.

Rev. C. J. S. Bethune read a paper of much interest on the occurrence at Port Hope of immense numbers of *Aletia argillacea* on the 8th and 9th of October.

Prof. Macoun suggested the basswood tree as a possible food-plant of the larvæ, because there were not in the district sufficient malvaceous plants to furnish food for such numbers of insects.

Mr. Fletcher said that careful search had been made for several years on this tree, as well as on all plants allied to the cotton plant, but no traces of larvæ had been found. He had hitherto been inclined to believe that the moth bred in Canada, and that the theory of migration from the cotton States was not tenable, but what he had learned concerning the appearance of these insects this autumn had somewhat changed his views.

Mr. W. Hague Harrington stated that the appearance of the moths had been very noticeable at Ottawa at almost the same date as they were observed at Port Hope. The first week of October had been comparatively wet, with calms and light winds varying from east through south to west. Sunday, 9th Oct., had been a remarkably mild day, and on that evening the moths had swarmed at some electric lights. On the following morning he had observed upon the front of the Ottawa Bank a great number of moths, at least 250 or 300. The building faced the north, being situated opposite the Parliament Square, and had in front of it an electric light. Moths were also seen at several points in the city, but not in any

great number. From the fresh, unrubbed condition of all those seen he then thought that they could not have flown far, and that possibly they might have been bred upon some of the plants on the Government grounds. Since hearing Mr. Bethune's paper, however, he was more inclined to favor the migration theory.

Mr. J. Alston Moffat reported that on Friday night, 7th Oct., immense swarms had appeared at Hamilton. He was informed by a friend that on that evening they had been around the electric lights literally in millions—the numbers being so great that he could not attempt to give an idea of them, other than by saying that all the insects previously observed by him were as nothing in comparison. Mr. Moffat visited the section of the city where they had been most numerous, on the following afternoon, and found the ground for a space of several yards around each electric light pole covered with these insects, every inch having at least one moth. Immense numbers had been crushed under foot, but the rest were lively, and darted off in their accustomed manner when disturbed. That night they were very abundant, but Sunday evening was wet and their numbers were lessened.

Mr. J. M. Denton said that in London the moths had not been observed, although there was an electric light quite near his house.

After the discussion the general opinion of the meeting was that a migration seemed indicated, and it was resolved that endeavors should be made to find out if the moths had been observed at points intermediate between Canada and the Southern States.

Mr. Fletcher exhibited some beautiful paintings, kindly loaned by Mr. Scudder, of four species of Thecla, viz., *strigosa*, *acadica*, *calanus* and *Edwardsii*, and he also showed specimens of several species of these butterflies, and pointed out the points of distinction or affinity.

It being one o'clock, the meeting adjourned until 2.30 p. m.

The afternoon session opened by the reading of a paper contributed by Prof. E. W. Claypole, "Suggestions to Teachers on Collecting and Preserving Insects," followed by two by Capt. Gamble Geddes on "Several Remarkable Captures during the Summer of 1887 in Ontario," and "Notes on the Genus Argynnis whilst Alive in the Imago State." In the discussion which followed the former paper, Mr. Moffat described his own capture of the ♂ of *Pelecinus polycerator*, and Mr. Fletcher described the unusual abundance at Ottawa of *Colias philodice*. At an excursion of the Field Naturalists' Club to Brittania, a few miles from the

city, the sandy shore of the Ottawa had been so thickly covered with them for a distance of several hundred yards, that at one stroke of the net he had captured 47, which, strange to say, were all males.

Prof. Saunders stated that he had made search near London for the larvæ of *Papilio cresphontes*, where it had formerly been captured, but without success.

Mr. Fletcher exhibited a fine collection of Canadian species of the genus Chionobas, and explained the great value of these insects on account of their rarity hitherto in collections. *C. Macounii* Edw. was a new species which had been collected by Prof. Macoun at Nipigon in 1885, and the Rocky Mountains in 1886. Closely allied to it was *C. Gigas* Butler, of which until the past summer only three specimens were known in collections. Other beautiful species exhibited and described were *C. Californica*, *C. Chryxus*, *C. Jutta*, *C. Varuna* and *C. Uhleri*, of which Prof. Macoun had taken specimens in the Rocky Mountains.

A pleasant and valuable paper by the Rev. George W. Taylor, of Victoria, B. C., was read, describing an ascent of Mount Finlayson, B. C., in search of *C. Gigas*, and the success which had attended the party.

Prof. Macoun, who had accompanied Mr. Taylor, described the manner of flight of this butterfly, which was swift and ceaseless, as was the case with the specimens of *C. Macounii* taken at Nipigon; all the specimens taken, it may be added, of both species, were males.

Mr. Fletcher exhibited three specimens of the rare *Papilio Nitra*, two taken by Prof. Macoun in the Rocky Mountains, the other by Mr. N. H. Cowdry at Regina, N. W. T.; also some interesting species and varieties of Colias, regarding which there was discussion by several of the members.

Attention was then called to the valuable paper by Mr. H. H. Lyman in the October number of the ENTOMOLOGIST, and the beautiful plate accompanying it. A series of the moths brought by different members of the Council was examined in connection with this paper.

Mr. J. Alston Moffat exhibited and distributed among the members specimens of two new species of moths which had been captured by him at Hamilton, and which had been described by Prof. Fernald and Prof. Grote respectively as *Proteoteras Moffatiana* and *Scopelosoma Moffatiana*.

Mr. Fletcher showed specimens of an Halesidota and of its larvæ, which had been very abundant and destructive upon the Douglas Fir in British Columbia during the past year. He also distributed a collection of Coleoptera sent from Vancouver Island for this purpose by Rev. G. W. Taylor.

Mr. W. Hague Harrington read a paper on the "Nuptials of Thalessa," describing the emergence and copulation of these the largest of our Hymenoptera (CAN. ENT., p. 206).

Mr. Moffat read a suggestive paper on "Species and Varieties," deprecating strongly the doing away with all names distinctive of well marked varieties.

Prof. Macoun agreed with Mr. Moffat that every variety should have a name distinguishing it, and that much was lost if such was not the case.

Rev. C. J. S. Bethune submitted a circular letter from Prof. Alfred Wailly, of England, asking for specimens of any silk moths or their cocoons.

Mr. Fletcher drew attention to an article which had appeared in the August number of the *Canadian Horticulturist*, condemning the use of Paris green as an insecticide. He considered that article inaccurate and very injurious, as it might prevent the farmers from making use of this most valuable remedy, and in confirmation of his opinion read a letter from Prof. A. J. Cook describing experiments with Paris green, and proving that no ill effects could result from eating potatoes or fruit upon which it was used in the ordinary manner for the prevention of insect attacks.

Mr. Harrington submitted a note on "Further Observations on *Oryssus Sayi*," in which attention was also drawn to a clerical error in paper on that insect in the May number of the ENTOMOLOGIST.

A vote of thanks was unanimously ordered to be conveyed to the Mayor and City Council for the use of the council chamber and committee room in the City Hall for the meetings of the Society.

The meeting adjourned at 6 p. m., *sine die*.

W. HAGUE HARRINGTON, Secretary *pro tem.*

HISTORY OF THE PREPARATORY STAGES OF COLIAS ALEXANDRA, EDW.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Fusiform, thick in middle, tapering both ways, the base a little broader than the summit; some examples have the side convex from middle to either end, but others have the upper half a little incurved; ribbed longitudinally, the number of ribs sixteen, three or four of which

end at about four fifths the distance from base; ribs low, narrow, the spaces between flat, and crossed by many fine ridges; top rounded; the micropyle is in centre of a rosette of fine cells, outside of which is a ring of larger ones; color yellow-green. Duration of this stage four days.

YOUNG LARVA.—Length .07 inch; cylindrical, a little thickest on 2 and 3; on the ridges of the segments are many black points, each of which gives a short white hair; among these are rounded black tubercles, some of which give long black hairs, but most bear short white clubbed appendages, longest on 2 and 13; on 3 and 4 these are in straight cross row, four on either side, the lowest being in line with the spiracles, bent after 4, and to 12, there are three on either side, disposed so as to make three longitudinal rows, of which the sub-dorsal has the appendage on the front ridge, the upper lateral on fourth ridge, and mid-lateral on second ridge; on 2 are three appendages on either side the mid-dorsal line, two of them at the front, the third behind and between the others; lower down on same segment are two more in vertical line; on all segments from 2 are two black hairs over feet and legs, and in same line; color greenish-brown; head rounded, scarcely depressed at top; color black; the hairs white. Duration of this stage 4 to 5 days.

After first moult.—Length .14 inch; nearly same shape; the appendages present, those on dorsum paddle-shaped, quite broad at top, the thin side running with the long axis of body, those on sides clubbed; all from black tubercles; color brown-green; head more green than body, rounded, depressed; with many white tubercles and white hairs. Duration of this stage about 6 days.

After second moult.—Length .2 inch; color yellow-green, thickly covered with a white down; head color of body. During this stage the larvæ became lethargic, and so passed the winter.

After third moult, in spring.—Length .36 inch; color dark green; the basal ridge yellowish, but there is no distinct band; head as before, yellow-green. The next moult took place about seven days after the larvæ began to feed.

After fourth moult.—Length .6 inch; color dark yellow-green; there is now a band along base, pure white, stained in middle of some segments, usually 3, 4 and 12, with pink; as the stage progresses, the pink appears on other segments and in a few hours runs through the length of the band.

MATURE LARVA.—Length 1.1 inch; shape of *Eurydice* and *Philodice;* color one shade of yellow-green, the under side a little lighter;

much covered with small black tubercles, the hairs from which are short, straight, and over dorsum, black, but on the sides, gray; along base a white band, with broken dashes of red-orange running through it; head rounded, depressed at top; color yellow-green, studded with black tubercles, which give short black hairs. From fourth moult to pupation 13 days, in April.

CHRYSALIS.—Length .8 inch, greatest breadth .2 inch, depth .26 inch; shape of *Eurydice* and *Philodice;* compressed laterally, the thorax prominent; the head case pointed, beak-like; the mesonotum rounded (almost angular); color yellow-green, the dorsal side darker than ventral; on ventral side of abdomen next wings three small reddish spots in line. Duration of this stage 9 and 10 days.

On 29th July, 1884, I received 16 young larvae, hatched *en route*, from Rosita, Col., sent by Mr. H. W. Nash, the eggs laid 23rd and 24th July, on Astragalus. On 2nd Aug., they began to pass first moult, on 8th the second moult. Shortly after, they became lethargic, and I sent them to Clifton Springs, New York, to be placed in the "Cooler" for the winter. On 7th March, 1885, I received them from Clifton, all dead but one, and this died a few days later.

On 18th Aug., 1886, I received six larvae hatched *en route*, sent from Central City, Col., by Prof. G. H. French, the eggs having been laid on Thermopsis Tabacea var. Montana. These larvae began to pass first moult, 25th Aug.; the second moult was overlooked; on 4th Sept., two out of five larvae became lethargic, and by 11th Sept., the other three had gone same way. In October, all six were sent to Clifton Springs. These came back alive, 21st March, 1887, and were placed on white clover in pot, and covered by muslin bag. On 1st April, they were first noticed as feeding; on 7th, one larva passed 3rd moult; this one passed 4th moult, 13th April, and pupated 26th April. The imago came on 6th May, a female of type *Edwardsii* in some important points, the marginal borders to fore wings being unusually broad and heavy.

The second larva passed third moult on 15th April, the fourth on 25th, pupated 5th May, and the imago came out 14th May, a female, typical *Alexandra*, with no borders whatever. This one was like the parent female, and consequently the spring butterfly in this case was like the fall butterfly that produced it.

On 28th June, 1887, I received four young larvæ from Central City, the eggs having been obtained by Master William Lake, at the request of

Prof. French. These were of the earliest butterflies, and I expected to raise them to imago the same summer.

On 2nd and 3rd July, all these larvæ passed 1st moult; on 6th July, two passed 2nd moult; on 10th or 11th, one passed 3rd moult. On 27th July, the three survivors had been lethargic for about a week, as I recorded. Later, I sent these to Clifton Springs. So that larvae from the earliest flight of the butterflies, as far as observed, hibernate, as do the larvae of the later flight, and all would produce butterflies in spring. How comes it then that there is the appearance of a second brood of the butterfly in late summer, or August? Apparently one brood flies in June, another in August, though fresh butterflies are also found in July, and one would expect eggs of the June brood to produce the August butterflies. The explanation I conceive may be this: in June, the butterflies from the lower elevations first come from pupae, in July from higher elevations, and in August from the highest of all, and a constant stream of fresh butterflies is kept up from higher to lower elevations. Mr. David Bruce has collected several seasons in Colorado at every altitude, and in 1887, particularly, his attention was directed to the habits of *Alexandra*, and this is what he writes 22nd Sept., 1887: "I think my notes and the specimens sent will satisfy you that there can be but one brood annually of *Alexandra*. This species is a powerful flier and takes very long flights, and in the narrow canons will fly along the side of the trail or stream down hill for miles. Even Colias *Meadii*, when it once gets in the canons, will follow the track, and I have found several at Webster, 9000 feet, and below it, though their proper habitat is 2000 or 3000 feet higher." *Alexandra* is found at various elevations from 6000 to 10,000 feet.

As to *C. Edwardsii* and its relationship to *Alexandra*; I have of late years thought it probable that the former might be a dimorphic form of the other. But if there is but one annual brood of *Alexandra*, that view is not tenable. *Edwardsii* was named by Dr. Behr, from examples taken in Nevada, and was first described in vol. 1, But. N. A., in 1869. At that time very few examples were known, and the same is true as to *Alexandra*, originally described in 1863. It was not till Mr. Mead collected in the summer of 1871, in Colorado, that *Alexandra* became better known. Since then a vast deal of collecting has been done in Colorado, and *Alexandra* is found in every collection. *Edwardsii* yet differed from *Alexandra*, as known up to 1869, in the shape of the wings, these being narrow, the fore wings pointed apically, the hind margins incurved;

in contrast to the shorter and broader wings of *Alexandra*, with rounded apices and hind margins. The fore wing of the female had more or less of a marginal border, and there was an orange discal spot to hind wing. In *Alexandra*, the female had no border, but was immaculate, and there was but a pale discal spot, if any at all, on hind wing, and never orange. There were other differences of less importance perhaps, but the ones mentioned were enough to make the separation of the two forms not merely proper but imperative. In 1877, Pr. Cal. Acad. Nat. Sci., Mr. Henry Edwards expressed the opinion that *Edwardsii* was but a variety of *Alexandra*, and with my present experience, I can only join in the same conclusion. The two females which came from one laying of eggs, as before related, were of the two types in many respects. One was immaculate, and altogether, in color and markings, the typical *Alexandra* as figured in B. N. A. (and like the mother insect), the other had the marginal border of *Edwardsii*, while both had the pointed wing given as characteristic of the latter. The species is *Alexandra*, and *Edwardsii* a variety of the same.

Among the many examples recently sent me by Mr. Bruce are two albino females, one with, the other without, any traces of marginal borders. Usually the discal spot on under side of hind wing is without a circlet, but I have two males with a narrow brown ring, and one of these has a second small spot, such as appears in many species of the genus. One of Mr. Bruce's males has a broad, not very distinct, border outside the ring. Generally the fringes throughout are yellow, but occasionally they are pale pink. Some examples have no pink at base of hind wings, others a minute patch of it. In none have I ever seen a trace of submarginal spots on either wing below, or of a patch at outer angle of hind wing.

NOTES ON THE GENUS ARGYNNIS WHILST ALIVE IN THE IMAGO STATE.

BY GAMBLE GEDDES, TORONTO, ONT.

1. ARG. LAIS, Edw.

A new species discovered by me in 1883, whilst collecting for Mr. Henley Grose Smith, of England. It was described by Mr. W. H. Edwards shortly after my return. In the end of June and beginning of

July, I found this insect easy to capture. It was comparatively rare in some districts of the North-west Territory, but at the principal crossing of the Red Deer River and the neighborhood of Fort Edmonton, it was quite common. When the orange lilies of the prairies, *Lilium Philadelphicum*, were in bloom, I took many specimens of both sexes upon these flowers, and could approach them quite easily with the killing bottle, and so avoid the necessity of using a net and running the chances of rubbing their wings. Mr. Edwards has figured this species in Part I., Vol. III., of the "Butterflies of North America."

2. ARG. CYBELE, F.

Taken at Edmonton and surrounding country, flying in company with *Lais* and attracted by the blossoms of the numerous vetches which occur in that district.

3. A. CORONIS, Behr.

This beautiful insect I found most common at Fort Macleod, but I also took specimens in the Kicking Horse Pass, and at Calgary, 100 miles north. Here they were not by any means plentiful. It occurs principally late in the season when the harvesting is going on, and when the Golden Rod is in bloom. At the entrance to the Kootenay Pass many perfect specimens were taken. The specimens captured were very variable, and one was thought by Mr. Edwards to be new; it turned out however to be *Coronis*. The specimen was called by him *Arg. Baucis*, and is now in the collection of Mr. Henley Grose Smith, Isle of Wight.

4. A. CHARICLEA, Schneid.

5. A. BOISDUVALLII, Somm.

I took both these species in the Crow Nest Pass, and both at great altitudes. Strange to say, I saw none of them in the foot-hills, or the rolling prairie, but last summer *Arg. Chariclea* appeared in large numbers in the hills at Port Arthur, Lake Superior. It would be useful to know from any members of the Society what their observations have been regarding the localities of these species. They seem to be in perfect order all through the summer, and quite like *A. Myrina* in this respect.

6. A. ATLANTIS, Edw.

This species occurred in all parts of the Mountains, and was at its best in the early part of July.

7. A. Eurynome, Edw.

First taken about Calgary, N. W. T., and afterwards in all the valleys here and there through the Rocky Mountains. It has many varietal forms. The silver spots on under side of secondaries are nearly covered over with yellow and green scales in some specimens, whilst in others they are silver to the very edges of the spots. This species was abundant in the vicinity of the Crow Nest Pass in all its forms, including *Erinna* and *Arge*. Some of the specimens also varied much in size, the smallest being about the same measurement across the primaries as *Arg. Myrina*. This was particularly noticeable in the males, the females being for the most part of an uniform size.

8. *Var.* Erinna.

9. *Var.* Arge, Strk.

No notes were particularly taken in connection with either of these forms.

10. Arg. Clio, Edw.

In capturing this insect in 1883, I thought that I was the happy possessor of *A. Bischoffii* or *A. Opis*, and wrote to Mr. W. H. Edwards to that effect. It turned out otherwise, however. *A. Clio* was first seen by me and taken in small numbers in 1883, but in 1884 occurred more commonly in several distinct localities.

11. Arg. Artonis, Edw.

This is uncommonly like *Clio*, in my opinion, and I have not been able to distinguish one from the other up to the present time.

12. A. Monticola, Behr.

I took but very few of this species in the Crow Nest Pass, and they varied much from other specimens I have seen, notably from California. In the Kicking Horse Pass and other localities in the Rocky Mountains, however, larger varieties were captured resembling very closely specimens from the southern slope of the Pacific coast. The silver spots usually found in the Argynnidæ on the under side of the posterior wings were entirely of a yellow color, and no appearance of silver was visible in the smaller specimens, whilst in the larger varieties more than two-thirds of the spots was covered with silvery scales.

13. A. Edwardsii, Reak.

14. A. Nevadensis, Edw.

A. Edwardsii is a lively insect to follow with a net, and a man must

be in excellent training to do much with it in that way. I have been led away a long distance from my camp (and often from a well-earned meal) upon seeing one of these insects flit by. It is, like its confrère *Arg. Nevadensis*, a bewitching and tantalizing creature— bewitching because of the beautiful combination of the pale green and silver of the under side in the sunlight, and the red and orange of the upper side which contrasts so wonderfully and at which one gets a glimpse occasionally during its flight. It flies more like the Satyridæ, by which I mean it folds its wings completely over its back whilst flying, and seems to traverse a long space until it becomes necessary to open the wings again to prolong its flight, or to settle on the ground. Tantalizing, I call it, because it indulges in short and rapid flights, making one suppose it is an easy matter to follow it a few yards and then capture it. I have had to creep along on all fours sometimes, and occasionally drag myself along on my stomach, to secure these specimens, and then have missed about 50 per cent. of the number followed. *Nevadensis* and *Edwardsii* do not fly high, and when alighting after a short and rapid flight, they expand the wings to the full extent, until the edges touch the ground. This of course is when they alight on the bare soil, which they frequently do. Like most Argynnidæ, they are both fond of the thistle, and are much more easily approached when sipping honey from the flowers than when they come down to the ground.

15. A. Bellona, F.

This small species has been taken in large numbers in the vicinity of Brandon, Manitoba, and the further west I proceeded the rarer it became. At Calgary it was quite rare, and resembled *Epithore* very much, with the exception of the darker colors on both upper and under surfaces of the wings.

16. A. Myrina, Cram.

Only at one point in the North-west was this species common, and that was about 50 miles west of Calgary. As in this part of the country, marshes and the edges of streams were the principal haunts.

17. A. Triclaris, Hüb.

Taken only at extreme altitudes, where snow was plentiful on the neighboring hills and peaks.

18. A. Leto, Behr.

This is a remarkable looking insect on the wing, and until the eye becomes accustomed to it, may be taken for a Papilio. I allude to the

♀, for I cannot remember seeing a ♂ flying, or if I did, was not prepared to make notes about it. As most of our collectors are aware, the ♀ and the ♂ differ in appearance considerably, the female being a very dark brown (almost black) and yellow, whilst the male is red and brown like any other Argynnis.

I append a list of Argynnidæ which I have myself taken at different times, with notes on their flight and habits.

1. *Arg. Lais*, Edw. Very lively on the wing, but easily captured with cyanide bottle from flowers.

2. *Arg. Cybele*, F. Precisely the same as *Cybele* in this Province in its movements. I never saw *Cybele* from the time I left St. Paul, Minn., until I arrived at Edmonton, N. W. T.

3. *Arg. Coronis*, Behr. Extremely lazy and easy of capture. I have walked through patches of golden rod and knocked the stalks and flowers about considerably without disturbing *Coronis*. I have also taken them between my thumb and forefinger without any attempt at escape.

4. *Arg. Chariclea*, Schneid.; 5. *Arg. Boisduvallii*, Somm. Not a particularly lively fly. Often difficult of capture, as it flies high in the air at certain parts of the day, particularly the evening. I was not aware that these were separate species until my return, and so my notes apply to both.

6. *Arg. Atlantis*, Edw. A curious fact in connection with the dark variety of *Atlantis* taken in the Mountains is that it constantly alighted on the trunk of a tree head downwards, like the Graptas often do. Very lively and about only during the brightest part of the day.

7. *Arg. Eurynome*, Edw. A slow insect for the most part and easily approached.

8. V. *Erinna;* 9. V. *Arge*, Streck. Not observed.

10. *Arg. Clio*, Edw. Principally males taken; very quick and hard to catch without rubbing the wings.

11. *Arg. Artonis*, Edw. Same as above.

12. *A. Monticola*, Behr. Very rapid flight; hard to take.

13. *A. Edwardsii*, Reak.; 14. *A. Nevadensis*, Edw. Short zig-zag flight; alights quite frequently on the ground; extremely difficult to take either in flight or whilst at rest.

15. *Arg. Bellona*, F. Specimens taken altogether whilst flying, with only one or two exceptions. Comparatively easy to catch on the wing.

16. *Arg. Myrina*, Cram. Same as any locality in Ontario.

17. *Arg. Triclaris*, Hüb. Slow in flight, but difficult to take, as it flies over boggy and marshy places in the valleys amongst the snow-caps.

18. *Arg. Leto*, Beh. ♀ only observed; lively in flight and easily distinguished from its dark brown and yellow colors.

NOTES ON CALLIMORPHA.

BY JOHN B. SMITH, WASHINGTON, D. C.

In the early spring of 1887, while arranging the National Museum collection of *Arctiidæ*, I tried to make out the varieties of *Callimorpha lecontei* listed in our catalogues, and soon came to the conclusion that we had to do with more species than were generally accepted. I investigated the literature of the subject and prepared a paper, the results of which were first communicated to the Entomological Society of Washington at their March meeting (see Entom. Americ., iii., p. 20). At this time I had concluded to describe three new species, viz., *lactata*, *suffusa* and *confusa*, and prepared the descriptions for Ent. Am, sending the MSS. of the monograph to the Proceedings of the National Museum. For reasons hereinafter stated, I finally identified my *confusa* with *lecontei* Bd., and withdrew my description of that species, changing also the name in the proof of the monograph.

The descriptions of *lactata* and *suffusa* appeared in Ent. Am., iii., 25, and I refer on p. 26 to the monograph of the genus for the Proc. U. S. N. Museum.

In August, at the meeting of the Ent. Club, A. A. A. S., I read from advance sheets of my paper the substance of my conclusions, and tried to convince the gentlemen present of their correctness—I grieve to say, with very little success, as a reference to the report of the meeting in Ent. Am., iii., 103, will show. Mr. Lyman, to whose paper I will presently refer, had evidently not seen this when his MSS. went to the printer.

Prof. Riley, and Messrs. Hulst and Graef vigorously opposed my views, and one emphatic gentleman (not in open meeting, however,) pronounced them profane adjectived nonsense. Mr. Edwards wrote me I was all wrong, and Mr. Butler, whose reputation as a lumper is none of the best, considered six species an abundance, and they not very good ones either.

My paper appeared Sept. 16th, and was distributed to correspondents

of the Museum; my extras came in a few days later. No one has responded as yet, so I do not know whether I have made converts or not.

Under these circumstances, Mr. H. H. Lyman's paper on the species of *Callimorpha*, CAN. ENT., Oct., 1887, agreeing as it does in the main with my own conclusions, was most gratifying, and restores to some extent my faith in the intelligence of Lepidopterists. Mr. Lyman, while agreeing in the main with my results (he could not have seen my paper), presents some differences to which I beg to call attention. I will do it under the call of species, following his order, which differs from my own.

C. LECONTEI Bd.

Mr. Lyman accuses me of mistaking the type of this species, and he is right. My excuse is that I have never seen *lecontei* as Mr. Lyman here fixes it. I had seen Boisduval's figure, and Herrich-Schaeffer's figure, which evidently referred to the same species. I have never seen specimens like Mr. Lyman's figures 1, 2 and 3. His figure 4 and all the others are familiar to me. The most obvious and striking point in Boisduval's figure was the transverse black band near the base of the primaries, and as I knew only one species that had this peculiarity, I referred the name to that species, crediting the figures with sufficient inaccuracy to cover the differences between them and my specimens. I did not deem it possible that there was a form that I had not seen, so close as to be confusing. As it proves, I was mistaken, and I confess Mr. Lyman's figures 1, 2 and 3 were a surprise to me. He is undoubtedly correct, however, in his references and identification of the species.

Var. *confinis* Wlk. This is without doubt a mere synonym of *militaris* Harr. Mr. Butler kindly sent me a drawing of that form. The Museum series readily fills all gaps between figures 6 and 8 on Mr. Lyman's plate.

Query.—Is the typical *lecontei* local? It seems passing strange that none of the numerous collections I have seen should have a single specimen referable to it, so as to save me from blundering!

C. CONTIGUA Wlk.

This needs no further reference. I thoroughly agree with Mr. Lyman in all he says. It may be well to say here that in my paper I have described and figured the genitalia of nearly all the species, and the differences there noted bear out the conclusions otherwise reached.

C. CONFUSA Lyman.

Undoubtedly a good species, which in my paper I have referred to as

lecontei. The specific character of markings is found in the form of the broad half band of the primaries that arises from the internal margin, and sends off from its summit a band to the outer margin below the apex, and a spur inwardly. In my paper I figure some varieties with the markings much more nearly obsolete. Mr. Lintner's description of the larva of *C. lecontei* (Ent. Contr., iii., 143) refers to this form. I have seen the imagos. Mr. Lintner found it on Spear-mint, *Mentha viridis*.

I have found the species common in the Catskills, where all the specimens taken were of this species. At first, as above suggested, I was inclined to consider this a distinct species, and oddly enough selected the same name for it that Mr. Lyman did. My reasons for changing my opinion have been already given.

C. SUFFUSA Smith.

This is the species figured by Mr. Stretch in his Zygaenidæ and Bombycidæ as typical of *lecontei*, and he credits Mr. Saunders with the specimens. This is my authority for the locality, Canada, for this species, and also my authority for referring Mr. Saunders's description of the larva in CAN. ENT., i., 20, to this species, though somewhat doubtfully.

Unaware of the existence of forms like the true *lecontei*, I also assumed from these facts that Mr. Caulfield referred to this form as *lecontei;* he assumed the distinctness of *lecontei* and *militaris*, which proves unfounded, and which also misled me. I am sorry my name does not please Mr. Lyman. The matter is not so bad as it might be, however, since, as I shall show hereafter, the name *clymene* is misapplied and must be credited to a different species. The species varies quite extensively, and I have figured a number of the forms. One specimen is nearly immaculate, having only the margins dusky.

C. FULVICOSTA Clem.

Mr. Lyman should have cited as a synonym *Tanada conscita* Wlk., in part. He cites it for the ♀ only.

C. VESTALIS Pack.

Mr. Lyman cites this as a synonym of *fulvicosta*, in my opinion quite erroneously. Query—Whether Mr. Lyman really knows *vestalis?* It is smaller, whiter, without any creamy tinge, and appears more frail and *Euchaetes* like. I feel as confident of its distinctness as of any others of the species. To this I cite *Tanada conscita* Wlk., as I believe Mr.

Walker had this before him, with a yellowish ♂ *fulvicosta.* Mr. Butler writes of this species: "*H. conscita* = *vestalis* var. = *fulvicosta* var."

C. INTERRUPTO-MARGINATA De Beauv.

According to Mr. Butler, this form has been previously described by Peter Brown as *clymene.* The citation and description I have given in my paper. This will please Mr. Lyman, since it does away with an objectionable name, though it has the disadvantage of compelling a new association between name and insect.

C. CLYMENE Esp.

As this name was pre-occupied by Brown as above stated, the next name in order of time must be used, and this is *C. colona* Hb.—not cited by Mr. Lyman.

C. CONSCITA Wlk.

Mr. Lyman cites my name *lactata* as a synonym—erroneously, I think. Mr. Walker confused two, if not three, species under the one name, and in addition referred them to the wrong genus. Such a species as that intended by Walker never existed, and I do not think any point should be stretched in his favor. Besides, Mr. Lyman is not consistent. The same reasoning that makes *lactata* a synonym of *conscita,* will make *suffusa* a synonym of *reversa*—or worse—Mr. Stretch's description includes also *confusa* Lyman, and on this theory one part of Mr. Stretch's species is a synonym of *contigua.* I separated *suffusa,* and the name stands for the remaining part, viz., *confusa* Lyman, which would remain only as a synonym of *reversa.* I scarcely expect Mr. Lyman's adhesion to this theory, but unless he so holds, my *lactata* will stand.

I propose in view of the preceding, the following synonymy, adopting here my own order of species:

1. CLYMENE Brown.
   interrupto-marginata DeB.
   comma Wlk.

2. COLONA Hb.
   clymene || Esp.
   carolina Harr.

3. LACTATA Smith.
   ♂ *conscita* Wlk., in part.

4. LECONTEI Bd.
   var. MILITARIS Harr.
   confinis Wlk.
5. CONTIGUA Wlk.
   reversa Stretch, in part.
6. SUFFUSA Smith.
   lecontei ‡ Stretch et Auct.
   reversa Stretch, in part.
7. CONFUSA Lyman.
   lecontei ‡ Auct.
   reversa Stretch, in part.
8. FULVICOSTA Clem.
   ♂ *conscita* Wlk., var. *b*.
9. VESTALIS Pack.
   ♀ *conscita* Wlk.

For a full discussion of the generic characters and a history of the genus, I refer to my paper in Proc. U. S. National Mus., 1887, pp. 338–353, and plates xiii. and xiv.

[Mr. Lyman's paper was in type before the end of September, and was in our hands in MS. some time before. He could not, therefore, have seen Mr. Smith's paper. Our October number was delayed for three weeks, waiting for the Plate.—ED. C. E.]

FURTHER OBSERVATIONS ON ORYSSUS SAYI.

BY W. HAGUE HARRINGTON, OTTAWA.

During the past season I endeavored, as opportunity offered, to confirm and supplement the observations upon this insect recorded in the May issue of the CANADIAN ENTOMOLOGIST, pages 81–86. The insects appeared at least ten days earlier than in 1886, and on 29th May I captured, upon the old sugar-maple near Hull therein mentioned, four males, which were entirely black—var. *affinis*. Of these, one was dead in a spider's web, and had evidently furnished a meal to the spinner, and another had just been seized by a jumping spider of moderate size. On the following day I took a ♀, var. *occidentalis*, which had sought shelter,

or concealment, in the burrow of a *Dicerca divaricata*. I also saw a specimen just about to emerge from its own burrow, down which it rapidly retreated backward, when I commenced to dig with my pocket knife in the tough wood. On 3rd June, Mr. Fletcher and the writer saw a ♀ var. *terminalis* ovipositing in a minute crack in the perfectly dead dry wood of the same old sugar-maple. The ovipositor of this insect was found to be one and one-quarter inches in length. At the same time I obtained two males, var. *affinis*, and my companion captured two specimens. We also saw two in their burrows, and tried to cut them out, but the wood defied our knives, and the insects retired to the interior, their burrows being evidently of considerable depth. The following day we saw two specimens, one on a telegraph pole, the other on an old maple, and on the 7th I captured on the same maple a ♀ var. *terminalis* and two ♂'s var. *affinis*. I saw also two gnawing their way out, but could not get them. The last date of capture was on 9th June, when I found two just about to emerge, which I succeeded in digging out after some patient and difficult cutting. These were both males, one var. *affinis*, the other var. *occidentalis*, with two white marks on face, and a large triangular spot on terminal segment above. Of twelve specimens captured by me during the season (29th May to 9th June) there were var. *terminalis*, three ♀; var. *occidentalis*, one ♂, one ♀; var. *affinis*, seven ♂. This confirms my previous observations that nearly all those with a portion of the abdomen red are female, while those with the abdomen entirely black are male, although an occasional male will be found partly red, or a female entirely black. In conclusion, I wish to correct a clerical error in the paper above mentioned. On page 83, the seventh and sixth lines from foot should read:

1. *Oryssus Sayi* Westwood, 1835 = *maurus* Harris.
2. *terminalis* Newman, 1838 = *hæmorrhoidalis* Harris.

EXCHANGE.

Mr. W. Harcourt Bath, of Ladywood, Birmingham, England, is anxious to correspond with North American Entomologists with a view to procuring specimens of Canadian Dragon-flies, and is willing to give in exchange British Dragon-flies and Lepidoptera.

ERRATUM.—Page 218, line 10, for "guages," read "gangues."

INDEX TO VOLUME XIX.

Abbot's species in Bremen Museum, 113.
About names, 121.
Annual meeting, 221.
Apatela felina, preparatory stages of, 48.
Aphidivorous larvæ, 61.
Argynnis, notes on the genus, 231.
Ashmead, W. H., articles by, 125, 192.

Acanthaclisis Americana, 134, 149.
" congener, 154.
" fallax, 148.
" occitanica, 151.
" Texana, 147.
Acerota caryæ, n. sp., 128.
" *Floridana*, n. sp., 128.
" opaca, 128.
Aganisthos orion, 20.
Alaptus pallipes, n. sp., 193.
Aletia argillacea, 14, 223.
" hostia, 14.
Allotropa Americana, n. sp., 125.
Amblyaspis Americana, n. sp., 129.
" *longipes*, n. sp., 128.
Amphicrossus ciliatus, 63.
Anaphes mellicornis, n. sp., 194.
Anectata hirtifrons, n. sp., 198.
Anisodactylus Harrisii, 63.
" lugubris, 63.
Anisota stigma, 51.
" Virginiensis, 52.
Anomis erosa, 14.
Anopedias incertus, n. sp., 130.
Apatela felina, 48.
" vulpina, 20.
Arctia parthenice, 31.
" Saundersii, 30.
" virgo, 31.
Asthena albogilvaria, 4.
" lucata, 4.
Atrytone Kumskaka, 45.

Behrens, J., article by, 198.
Beetles, some European in America, 159.
Bethune, C. J. S., articles by, 116, 160.
Blanchard, F., article by, 180.
Bombycidæ, classification of, 156, 199.
Book notices, 15, 17, 34, 76, 93, 98, 116, 139, 160, 179.
Bowles, G. J., article by, 86.
British Columbian Hymenoptera, 19.
Butterflies, comparative table for families of, 201.
" North American, 19, 76, 117.
" of India, 15.
" of New England, 34.
" of the Malay Peninsula, 139.
" pairing of, 2.
" the earliest at the White Mountains of N. H., 101.
Butterfly, a fossil, 120.

Bactridium cavicolle, 63.
Betarmon bigeminatus, 64.
Brachys ærosa, 138.
" ovata, 139.

Callimorpha, on the North American species of, 181, 235.
Capsidæ taken at Buffalo, 69.
Catalogue of Canadian plants, 17.
Caulfield, F. B., article by, 73.
Chionobas, Canadian species of, 225.
Chloroform, use of in collecting, 21, 119, 137.
Clarkson, F., article by, 31.
Claypole, E. W., article by, 136.
Coccidæ in Museum of Comp. Zool., Cambridge, Mass., 60.
Cœnonympha ampelos, preparatory stages of, 41.
Coleoptera, natural history notes on, 62.
Coleopterology, synonymy in American, 105.
Colias Alexandra, preparatory stages of, 226.
" Hagenii, on the position of, 170, 218.
" notes on the genus, 166.
Collecting at electric light, 1886, 21.
" insects, practical notes on, 136.
Coquillett, D. W., article by, 12.
Correspondence, 80, 100, 138, 180, 199.
Cresson's Synopsis of Hymenoptera, 117.

Caberodes majoraria, 4.
Callidryas cipris, 20.
Carabus auratus, 114, 159, 180, 200.

Callimorpha confusa, n. sp., 185, 237.
Carpophilus hemipterus, 109.
Catillus maculipes, n. sp., 128.
Catocala amasia, 114.
" communis, 113, 114.
" desperata, 115.
" *elda*, n. sp., 199.
" Guenei, 115.
" neogama, 113, 114.
" vidua, 114.
Cecidomyia destructor, 93.
Cephalonomia Floridana, n. sp., 196.
" *hirticollis*, n. sp., 195.
Cicindela punctulata, 62.
Cidaria cunigerata, *var.* disjunctaria, 5.
Cimbex Americana, 80.
Clœotus aphodioides, 64.
Cnesinus strigicollis, 66.
Colias Alexandra, 226.
" Edwardsii, 229.
" eriphyle, 218.
" Eurytheme, 170.
" Hagenii, 170, 218.
" philodice, 170, 224.
Colobopterus excisus, 153.
Conocephalus dissimilis, 56.
" ensiger, 56.
" *exiliscanorus*, n. sp., 57.
" robustus, 57.
Cosmocoma maculipes, n. sp., 194.
Cymatophora umbrosaria, 4.

Davis, W. T., article by, 56.

Danais archippus, 80.
Deilinia variolaria, 4.
Diapria erythrothorax, n. sp., 196.
Dissosteira Carolina, 58.
" longipennis, 58.
Dryocampa rubicunda, 52.
Dryopteris rosea, 50.

Edwards, Henry, articles by, 145, 199.
Edwards, W. H., articles by, 2, 34, 41, 170, 218, 226.
Electric light, collecting at, 21.
Exchange, 240.
Exoprosopa, notes on genus, 12.
Explanation, an, 1.

Elaphidion parallelum, 143.
" villosum, 31, 141.
Endropia marginata, 4.
" textrinaria, 4.
Ephyra pendulinaria, 4.
Epimeces Americanus, n. sp., 129.
Europs pallipennis, 63.
Eustochus xanthothorax, n. sp., 193.
Exoprosopa doris, 13.
Exoptata, n. gen., 13.
" *divisa*, n. sp., 13.

Fernald, C. H., article by, 98.
Fletcher, J., articles by, 17, 19, 76, 80, 93.
Florida, new species of Proctotrupidæ from, 125.
Forficulidæ, Texan, 67.
Fossil butterfly, 120.
French, G. H., articles by, 5, 48.
Fyles, T. W., articles by, 59, 147.

Fatua Palmii, n. sp., 145.
Feniseca Tarquinius, 20.
Forficula exilis, 69.
" flavipes, 67.
" tæniata, 69.

Geddes, G., articles by, 166, 231.
Gillette, C. P., article by, 138.
Gordius in cabbage, 66.
Grapta C-album, note on European, 2.
Grote, A. R., articles by, 14, 20, 30, 34, 44, 50, 79, 113, 121, 156, 176,177,179, 200, 220.

Galesus Floridensis, n. sp., 195.
Gonatocerus dolichocerus, n. sp., 192.
" *nigritarsis*, n. sp., 192.
Gonepteryx mærula, 20.
Gonia exul, n. sp., 11.
" frontosa, 8.
" *porca*, n. sp., 10.
" *senilis*, n. sp., 10.
" *sequax*, n. sp., 12.
" the genus, 6.
Grapta C-album, 2.
" comma, 3.
" faunus, 3.
" satyrus, 3.

Hagen, H. A., articles by, 60, 89, 110, 133, 147, 209.
Haley, G., article by, 80.
Hamilton, J., articles by, 62, 105, 141.
Harrington, W. H., articles by, 81, 115, 206, 221, 239.
Hawk moths of North America, 98.
Henshaw, S. H., article by, 159.
Hessian fly, 93.

Heterocera, descriptions of new species of North American, 145.
Holland, W. J., article by, 61.
Homoptera, on the genera allied to, 177.
Hymenoptera, British Columbian, 19.
" Cresson's synopsis of N. American, 117.
" hints on collecting, 115.

Hemaris diffinis, 79.
" ruficaudis, 30.
" thysbe, 30.
" uniformis, 30.
Hemilexis mellipetiola, n. sp., 196.
Hesperia conspicua, 45.
" pontiac, 45.
Heterophleps Harveiata, 4.
Homohadena elda, n. sp., 5.
Hylotoma dulciaria, 59.
Hyperalonia, n. gen., 12.
Hypocampsis Pluto, n. sp., 131.

Ichneumon Vancouveriensis, 19.
Inostemma Cressoni, n. sp., 127.
" *Horni*, n. sp., 126.
" *Packardi*, n. sp., 127.
" *Rileyi*, n. sp., 127.
Isocybus longiventris, n. sp., 130.
Isorhombus hyalinipennis, n. sp., 129.
Isostasius musculus, n. sp., 126.

Jackson, J. A., article by, 119.

Lepidoptera, additions to list of Canadian, 4, 86, 88.
" " of Montreal, 86.
" notes on species of, 50.
Lepidopterous larva, 20.
Liphyra brassolis, larva probably Aphidivorous, 61.
Living pupæ, 18.
Locustidæ, notes on, and description of a n. sp., 56.
Lyman, H. H., articles by, 20, 181.

Labia guttata, 69.
" melancholica, 69.
" minor, 69.
Labidura riparia, 67.
Leptacis cynipsiphila, n. sp., 129.
Limacodes Beutenmuelleri, n. sp., 145.
Limneria compacta, 19.
Limochores pontiac, 45.
Lithophane fagina, 54.
" Georgii, 55.
Litus armatus, n. sp., 193.
Lobophora anguilineata, 4.
" montanata, 4.
Loxotropa mellea, n. sp., 196.

Maynard's Butterflies of New England, 34.
McNeill, J., article by, 58.
Mistaken identifications, 113, 159.
Moffat, J. A.; articles by, 4, 88.
Myrmelionidæ, stray notes on, 89, 110, 133, 147, 209.

Mantura Floridana, 66.
Maracanda, n. gen., 211.
" *amœna*, n. sp., 211.
" conspersa, 212.
" Henshawi, 216.
" pygmæa, 216.
" signata, 215.
Megistanis acheronta, 20.
Mesites subcylindricus, 66.
Mesoleptus fasciatus, 116.
Metaclisis belonocnemæ, n. sp., 125.
Monelata mellicollis, n. sp., 197.
Monocrita Canadensis, n. sp., 126.
" *melanostropha*, n. sp., 126.
Myrmeleon gulo, 155.
" nigrum, 156.

Names, about, 121.

Nicagus obscurus, 65.

Opheletes glaucopterus parasitic on Cimbex Americana, 80.
Ormerod, Miss, observations of injurious insects, 117.
" " on the Hessian fly, 93.
Osten Sacken, Baron, article by, 161.

Ooctonus longipes, n. sp., 192.
Oryssus Sayi, 81, 239.
" var. affinis, 83, 239.
" var. occidentalis, 83, 240.
" var. terminalis, 83, 240.

Papilio, a new variety of, 198.
Physonota, some further notes on, 73.
Pinophilus, species of, 63.

Plants, catalogue of Canadian, 17.
Proctotrupidæ, studies of N. American, 125, 192.

Pallodes pallidus, 64.
Palpares Burmeisteri, 93.
" caffer, 110, 133.
" cephalotes, 91.
" contaminatus, 112.
" inclemens, 89.
" immensus, 110.
" latipennis, 91, 133.
" luteus, 112.
" papilionoides, 110.
" pardalinus, 111.
Papilio cresphontes, 180, 225.
" nitra, 225.
" rutulus, var. *ammoni*, 199.
Parorgyia Clintonii, 55, 113, 114.
Petrophora cunigerata, 4.
" prunata, 4.
Phasiane mellistrigata, 4.
Phylax niger, 19.
" pacificus, 19.
Platygaster Floridensis, n. sp., 132.
" *gracilis*, n. sp., 132.
Platysoma tibialis, 19.
Polygnotus baccharicola, n. sp., 132.
" *solidaginis*, n. sp., 131.
Prionea lacertula, 146.
Prodryas persephone, 120.
Psilomma Americana, n. sp., 197.

Quadrina, on the genus, 40, 100.

Representative species, on so-called, 176.
Richia, on the genus, 44.

Saunders, H. S., article by, 21.
Saunders, Wm., article by, 1.
Saw-fly, Hylotoma dulciaria, note on, 59.
Scudder, S. H., articles by, 15, 45, 67, 101, 120, 139, 201, 217.
Shannon, W. P., article by, 180.
Smith, J. B., articles by, 100, 235.
Southern moths found in the north, 220.
Synonymy in American Coleopterology, 105.

Sactogaster anomaliventris, n. sp., 130.
Semiothisa minorata, 4.
Scotogramma Stretchii, n. sp., 146.
Sphinx cupressi, 146.
Spongophora brunneipennis, 67.
Synopeas melanocera, n. sp., 130.

Tachinidæ, North American, 6, 161.
Taylor, Rev. G. W., Provincial Entomologist in B. C., 178.
Termes flavipes, injury to living plants by, 217.
Thalessa, the nuptials of, 206.
Thecla augustus, note on, 147.

Tachina blanda, n. sp., 162.
" *deilephilæ*, n. sp., 164.
" futilis, 161.
" *hirsuta*, n. sp., 163.
" *theclarum*, n. sp., 166.
Terias elathea, 20.
Thamnonoma brunneata, 4.
Thecla falacer, 179.
" inorata, 179.
Trichacis brunneipes, n. sp., 131.

Van Duzee, E. P., article by, 69.

White ants, injury to living plants by, 217.
White Mountains, earliest butterflies at, 101.
Williston, S. W., article by, 6.

Xestonotus andriciphilus, n. sp., 128.

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DESCRIPTION OF THE PREPARATORY STAGES OF ARGYNNIS ATLANTIS, Edw.

BY W. H. EDWARDS, COALBURGH, W. VA.

Egg.—Conoidal, truncated, higher than broad, the base somewhat rounded; marked vertically by 14 ribs, one half of which reach the summit, the others nearly as far; the spaces between the ribs broad, excavated and crossed by ten or twelve fine ridges; the micropyle at top in centre of a rosette of five minute flat cells; and about these are successive irregular rings of cells, each larger than the one next within, to the verge of top; these are six and five sided, and some are sub-triangular, deeply excavated; color greenish-yellow when first laid, soon turning to brown. In shape, this egg is like that of other species of this genus, but it is characterized by fewer ribs than any with which I am acquainted. Duration of this stage 16 to 18 days.

Young Larva.—Length .06 inch; cylindrical, even; color of dorsum yellow-green, of sides and lower parts more yellow; marked as in other species of the genus by longitudinal rows of flattened tuberculous brown spots, there being three on either side over spiracles, each of which gives one or two long tapering hairs; below the spiracles is another row of similar spots, smaller, and on part of the segments broken into four spots, each with its hair; on dorsum of 2, an oval spot of same character as the others, with a row of hairs in front which are bent forward over the head, and a shorter row behind these; this oval spot corresponds to the four upper spots of the other segments; on the side is one spot above and another below spiracle, each with two hairs, and over the foot a smaller one, also with two hairs; on 3 and 4 each is an additional spot below spiracle, the three, on 2, 3, 4, making a demi-row; head obovoid, black, shining, with many long hairs. The larva hibernates directly from the egg.

After first moult, in spring: Length .11 inch; color brown-green; the spines in number and position as at maturity, and as in the genus, black, as well as the tubercles from which they spring; beset with many short, divergent, black bristles; head obovoid, black, with black hairs. Duration of this stage about 10 days.

After second moult: Length .16 inch; color gray-black with a green tint over upper side; under side pale green; the spines black, with black bristles; all the tubercles pale yellow; head as before, black. To next moult about 14 days.

After third moult: Length .32 inch; color gray mottled with black; a double dorsal stripe of gray; spines black; the bases of dorsal rows black on dorsal side, but yellow on outer side; of middle and lower rows dull yellow; head as before, but reddish-yellow, the back less red, more yellow. To next moult about 10 days.

After fourth moult: Length .5 inch; very much as at last previous stage, the dorsal lines same, spines same. To next moult about 6 days.

After fifth moult: Length .74 inch; slender; color brown-black, with a dorsal band of grayish-brown and not clearly defined markings elsewhere; these markings became distinct as the stage progressed.

Mature Larva.—Length 1.5 inch; slender, somewhat thickened in middle, the segments well rounded; on dorsum a broad greenish-yellow band, with a black line through the middle, edged by a little green; a narrow greenish-gray band between the dorsal and middle rows of spines, and a short band between the base of each dorsal spine and the next in advance of the middle row; these gray bands are of irregular width and the edges are whitish; the spaces between the bands brown-black; the sides, from middle row to the outside of lower row, gray with a rust-red tint in the middle of this area, and below to feet a darker, or more brown shade of gray; the spines are rather slender, swollen next base, above this tapering to a small conical top, from which proceeds a straight bristle; a few bristles about the sides, each from a tubercle, and standing at about 45° with the axis of its spine; the dorsal row are gray, the middle row gray tipped with rust-yellow, the lower row all rust color of deep shade; feet black, pro-legs gray-brown; head sub-cordate, the vertices rounded; color dull dark brown in front, dull yellow at back, with many short black hairs. From fifth moult to pupation 9 days.

CHRYSALIS.—Length .8 inch; shaped as in Group 1 of the genus; head case square, bevelled on either side about equally to the cross ridge; mesonotum prominent, carinated, followed by a deep and narrow depression; the wing cases very prominent at outer ends; abdomen conical, with fine tubercles corresponding to those of the larva; color mottled dark brown and black; the wing cases gray-brown. The only chrysalis I had died before imago.

I have several times in previous years had eggs of *Atlantis*, and the young larvæ from them, but always had the ill luck to lose the latter during the winter. But, 25th Aug., 1886, I received several eggs from Miss Caroline G. Soule, then at Stowe, Vt., laid 21st and 22nd. They hatched 3rd Sept., and the larvæ were placed in ice-house, and in October were sent to Clifton Springs, New York, to go in the "Cooler" at the Sanitarium there. They came back to me 21st March, 1887, most of them alive, and were laid on the tender leaves of a violet plant which had been forced in anticipation of their coming. One larva passed 1st moult 15th April, others two and three days later. The first to pass second moult was on 25th April, two passed same 29th. On 9th May, one passed third moult, the fourth 19th, the fifth 24th, and this larva pupated 3rd June, but died during the pupal stage. The other larvæ had died off from time to time before 4th moult. So that I am not able to give the length of the last stage to imago, but it is probably about 20 days, as in the allied species. The habits of the larvæ in confinement are in all respects like those of *Cybele*.

ATLANTIS is found over British America from Newfoundland and Anticosti to the Pacific. In the United States, over the mountainous parts of New England, New York and Michigan.

DESCRIPTION OF THE PREPARATORY STAGES OF ARGYNNIS EDWARDSII, REAKIRT.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Shaped generally like the eggs of this Group, higher than broad, about as 15 to 13, the number of ribs 30, conoidal, truncated, the middle but little narrower than the base, the upper half sloping rapidly, and convex; about one third the ribs reach the summit, the rest end at

from one half to two thirds distance from base ; the spaces between the ribs excavated roundly, and crossed by many fine ridges ; the micropyle in centre of a rosette of fine minute flat cells, outside of which are four irregular rings of excavated cells, generally long and narrow, varying from sub-crescent to five-sided ; color greenish-yellow. Duration of this stage 10 to 11 days, in July.

YOUNG LARVA.—Length .08 inch ; cylindrical, even ; color yellow-green ; marked as in the allied species by flattened, tuberculous, brown spots in longitudinal rows, three rows on either side above spiracles ; each of which gives one or two long, tapering hairs ; below the spiracles another row of similar smaller spots ; on dorsum of 2 an oval dark patch with a row of hairs in front, turned forward, and a shorter row behind ; head obovoid, bilobed, black, shining, with many long hairs. The larva hibernates from the egg.

After first moult, in spring : Length .1 inch ; color greenish-brown, mottled ; the spines as in the genus in number and position, stout at base, tapering to top, with many divergent short bristles ; head obovoid, black. Duration of this stage 9 days in April and May.

After second moult : Length .18 inch ; color gray ; a black mid-dorsal line ; the spines black ; the tubercles at base of dorsal spines black, of the middle row yellow-brown, of the lower row same and more decidedly ; head as before, black. To next moult 7 days, in May.

After third moult : Length .25 inch ; color gray and black, either dark gray or whitish, individuals differing ; a broad, clear gray band fills all the space between the two dorsal rows of spines, through which runs a black line, sometimes macular, or partly wanting ; the spines as at last previous stage, the yellow at bases darker ; head black over the front, yellowish behind. To next moult 6 days.

After fourth moult : Length .46 inch ; color over upper part black with yellow white and gray bands and stripes ; the dorsal band yellow-white, with more or less of a mid line of black ; between the dorsals and middle row a gray stripe, and from each dorsal spine a similar stripe runs to the base of the spine next in advance on middle row ; all the spaces between the band and these stripes black ; the sides gray ; the lower row of spines deep yellow at base and half way up, all others yellow at base only, remainder greenish-gray ; head as before. To next moult 7 days.

After fifth moult: Length .9 inch; color black and gray-yellow, the dorsal band brown-gray.

MATURE LARVA.—Length 1.4 inch; stout, the segments well rounded; the pattern of the markings similar to that of *Atlantis;* a broad dorsal band which fills the space between the two dorsal rows of spines, in color a deep yellow, cut throughout by a black line; between dorsals and middle row a narrow gray band, and a short band of similar color between the base of each dorsal spine and the spine next in advance on the middle row, these bands edged with whitish; the spaces between brown-black; below this area the sides to base are gray, mottled, with a shade of reddish-yellow, most decided in the middle part; feet black, prolegs green-brown; the spines as in *Atlantis;* of the two upper rows gray-green to base, a little yellow about base of those of middle row, and on 2 and 3 half up stem; those of lower row also yellow, except the upper half; the two dorsals on 2 are turned forward, but are not longer than the rest; head sub-cordate, the vertices rounded; color dull brown-black in front, dull yellow about top and behind. From fifth moult to pupation 15 days.

CHRYSALIS.—Length .9 inch; breadth across mesonotum, .24, across abdomen, .26 inch; general shape of this Group of the genus, but long and slender; head case square, bevelled on both sides to a cross ridge, which is a little arched; the corners rounded; mesonotum long, moderately prominent at rear and rounded, sloping to the front and rounding down to head case; carinated, the sides convex; abdomen conical; the wing cases prominent; color in shades of brown, the anterior parts dark and reddish, mottled, on mesonotum, with yellowish; on the tongue and antennæ cases reddish-yellow streaked and specked with dark brown; wing cases yellow-brown, with dark streaks along the nervules, and a small spot at end of cell; the abdomen has on the front of each segment a dark brown band, somewhat broken, and serrated; the rear part of the segments pale gray, mottled with patches of a darker shade. Duration of this stage 12 days.

This species is found in the Rocky Mountain region from Colorado to Montana, and was taken in Br. America by Captain Geddes, at Blackfoot Reserve (C. E., xv., 222).

SAPERDA FAYI, S. CONCOLOR AND APHODIUS RUFIPES.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

SAPERDA FAYI, Bland.—This beautiful Saperda breeds in the small limbs of Crataegus, especially *crus-galli* and *tomentosa*, as first observed by Mr. C. D. Zimmermann, CAN. ENT., 10, 220; and should it, like some of its allies, acquire a taste for cultivated fruit trees, it would be a formidable enemy, as is evidenced by the way it depredates on thorn bushes. The beetles appear here the last week in May or the first week in June, according to the season, the males preceding the females three or four days. They do not appear to eat and are short lived, the whole brood (except stragglers) appearing and disappearing within the space of ten or twelve days, so that should the collector be negligent, or the weather unsuitable for collecting at the time of their appearance, he may get none till the next season. As soon as the females appear the males are ready to associate with them, the union lasting three or four hours. They are not much given to flying about, usually ovipositing on the same tree they inhabited as larvæ. There may be several thorn trees not far apart, and one will be depredated on year after year till it is nearly destroyed, while the others will remain untouched till colonized apparently by accident. The beetles are sluggish, and when approached suddenly fall to the ground and quickly endeavor to conceal themselves, not feigning death, as many insects under the same circumstances do; and when I say feigning death, I mean it literally, in opposition to an unsupported dogmatic statement which I lately saw in print somewhere, "that insects can have no knowledge of death."

Oviposition is effected probably during the night, and the process has not been witnessed, nor the eggs seen. The limbs selected for this purpose vary from one third to one and one fourth inches in diameter, and according to the thickness of the limb, the female with her powerful mandibles makes from three to six longitudinal incisions through the bark, each about three fourths of an inch long and equi-distant and parallel to one another, dividing the circumference into sections nearly equal; an egg is placed in each end of each of these slits, and as soon as hatched the larva makes a burrow beneath the outer layer of wood, perhaps one eighth inch in length at first, and uses this as a retreat whence it issues to feed on the diseased wood caused by the incision. These slits and the

irritation produced by so many larvæ at work, cause an increased flow of sap to the part, and a consequent thickening of the sections between the slits, so that the injured part soon assumes a gall-like appearance. On the approach of winter, the larvæ having now attained the length of .25 inch, retire back a little further and close the opening of their burrows with borings. One of the larvæ, however, and in thick limbs two or three at each end bore obliquely till one of them reaches the centre of the limb, up which it proceeds, often two or three inches; the others parallel this, but keep a wooden partition between the burrows. These larvæ are much larger—often twice the size—of those inhabiting the outer wood, and are the only ones that produce beetles.

The whole of the interior of the limb is now dead wood enclosed by a growth of living but unsound woody tissue, through which some openings remain. The limbs are much weakened at these places, and many of them, like the oak on which *Elaphidion villosum* depredates, would be broken off by the winter storms were the fibre not very tough and the trees very low. And here analogy leads to the conclusion that as the larvæ inhabit the portion of the limb next the tree, equally with that beyond the injured part, this is likely to be the case in the history of the Elaphidion mentioned.

Many of the larvæ in the outside wood perish during the winter, and the survivors, after feeding a while in the spring, likewise die, their mission seeming to have been merely to insure a sufficiency of dead wood to sustain the life of the favored few destined for full development.

In the spring the larvæ in the deep wood return and feed on the dead wood, which is now abundant enough for all their wants, and by autumn they are nearly full grown; they again retire for the winter, and in the spring, after opening up communication with the outside world, feed for a short time, and when full grown measure in length about three fourths of an inch. The larvæ now return to their burrows for final transformation. Some of them bore for at least six inches, while others scarcely go from the entrance more than twice their own lengths; the outer ends are closely packed with borings without and soft fibre within, which also fills the inner ends. The head of the larva may be either toward or away from the opening—seemingly a matter of indifference; in the former case the beetle emerges from the place of entrance, in the latter from a round hole at right angles to the burrow, probably cut by the beetle itself, as no such hole has been detected in the many limbs I have examined contain-

ing pupæ with their heads turned from the opening. Pupation occurs after the middle of April, and the perfected beetle will be found in the limbs about the first of May, though few of them emerge till the time stated at the beginning of this paper.

The above is the result of three years careful observation of the habits of this beetle, and imperfect as the history is, the amount of time and labor expended in developing it can only be understood by those who have attempted similar things. How widely this beetle is distributed is uncertain, as till recently its habitat was unknown. The typical insects were taken in Ohio ; it is in Mr. Reinecke's Buffalo Catalogue, and occurs at Hamilton, Ontario (Moffat). Any one can readily ascertain whether it occurs in his fauna by examining the limbs of the Crataegus for the unmistakable swellings it occasions.

SAPERDA CONCOLOR Lec. appears about the same time as *S. Fayi*, and like it, is short lived, few individuals occurring after the middle of June. Its larvæ infest the canes of a small willow growing along water courses and in swampy places—*Salix longifolia*. The smaller canes are usually selected for breeding purposes, these varying from one fourth to three fourths of an inch in diameter. The beetle makes a longitudinal incision through the bark with her jaws about three fourths of an inch in length and in each end deposits an egg. Usually several incisions are made in the same cane some distance apart, which often cause its death the following year. The young larvæ follow the same course as those of *S. Fayi*, only they burrow deeper into the wood, and there are no supernumeraries, as there is no need for them, the wood of the willow dying much more quickly than that of Crataegus, and a warty, gnarly swelling occurring around each incisure.

The beetle, however, does not always select the smaller canes, sometimes choosing ones from one and one half to two inches thick, in which case the larvæ pursue a different course, for instead of boring up and down, they take a transverse direction and girdle the stem one third to one half its circumference, causing a rough annular swelling and frequently the death of the cane. Two years is the time usually required to complete the transformation, but some individuals probably pass through all the stages in a single year. The head of the pupa is toward the opening, from which the perfect insect emerges. The willow named seems to be the natural food-tree of the larvæ of *S. concolor*, and, did it confine itself

to this insignificant shrub, could scarcely be classed with injurious insects; but it appears to have likewise either a natural or an acquired taste for poplar, and might become very destructive, a fact first brought to notice in Bul. No. 7, 118, U. S. Ent. Com., where the compiler writes: "Girdling the trunks of sapling poplars, by carrying a mine around the trunk, which causes a swelling often nearly twice the diameter of the tree. We have found numerous saplings of the common poplar in the woods about Providence with the unsightly swellings around the trunk." In case this taste is perpetuated, this beetle will no doubt prove a formidable enemy to this species of shade or forest tree. But in what State this Providence is, or what kind of a tree "common poplar" is, we are not informed. Here the common poplar is the *Liriodendron tulipifera*, but at that Providence it may be a tree of some other genus. This beetle seems to have an extended distribution, occurring in Texas, Michigan, Canada and New York, as well as here.

APHODIUS RUFIPES Linn.—This fine beetle is an interesting addition to our list, and is fully described by Dr. Geo. H. Horn in his exhaustive Monograph of our Aphodiini, just published, Tr. Am. Ent. Soc. Phil., 14, 1. In Europe it is widely distributed, and, though probably indigenous here, as observed by Dr. Horn, has only recently been discovered owing to its inhabiting territory the Coleopterous fauna of which is very imperfectly known. Only three American specimens were known while Dr. Horn was writing the description, two taken at Deer Park, Garret county, Md., and one at St. Vincent's Abbey, Westmoreland county, Pa. Dr. Horn has now two specimens in his collection taken at the latter place, and I have one from Turkey Foot (now Confluence), Somerset Co., Pa., midway between there and Deer Park, which is in the extreme north-west corner of Maryland, the meridian of which to the north passes over a rugged semi-mountainous country; first over the hills bordering the Yonghiogheny thirty miles to Confluence, and thence through the Laurel Ridge Mountains forty miles to St. Vincents. How much further to the north or to the south-west from the points named it extends in a long range of country of the same general character, the future will determine. The two individuals I have examined, on comparison with my European specimens, do not differ perceptibly—a proof of the remarkable stability of species, considering the time that has elapsed since the ancestors of those of the two hemispheres parted company.

A NEW SOUTH AMERICAN GENUS OF CONOPINAE.

BY S. W. WILLISTON, NEW HAVEN, CONN.

Hitherto but a single genus *(Conops)* of this group has received general acceptance among dipterologists. A second genus, *Physocephala*, was based by Schiner on characters in themselves of but little importance, and which I did not deem sufficient to separate our species in the first paper I published * on the North American forms. A further study, however, convinced me that they were sufficiently constant to warrant their use, particularly in connection with other important ones in the neuration, which I pointed out.† I have recently had the opportunity of studying sixteen South American species of the two genera, collected by Mr. Herbert H. Smith, and I am yet more convinced of the validity of *Physocephala* as a genus.

A half dozen genera that Rondani attempted to establish (to say nothing of Lioy's fanciful productions) were based upon such confessedly trivial characters that they have no where commanded any attention by entomologists, save by Rondani's devoted follower, Mr. Bigot, who, in his last paper ‡ on this family, while rejecting *Physocephala*, accepts *Brachyglossum* Rond., based upon the comparative lengths of the proboscis. I do not think Mr. Bigot's views will receive the approbation of many dipterologists.

The only other genus which presents any claims for acceptance is *Pleurocerina* Macq., which I suspect was based upon an accidental malformation, the more so as I have seen several specimens of *Conops* and *Zodion* with a very similar projection of the front, springing from the frontal lunule, and due to some artificial cause. I am not aware that the type species, described from Tasmania, has been recognized since its original description, and I think the genus had better be held in abeyance till specimens are again examined.

The sub-family *Conopinae*, then, consists of two genera, to which I here add the third, distinguished from the closely allied *Conops* by excellent structural characters.

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* Trans. Conn. Acad., iv., 327.

† Ibid., vi., 388.

‡ Ann. Soc. Ent. Fr., 1887, 31.

TROPIDOMYIA, gen. nov.

Face, in profile, vertical and straight, with a median sharp ridge, on the sides plane or gently concave, wholly without grooves or lateral ridges. In front view, the face shows, below, a sharp triangular notch, rising a little above the lower border of the eyes, from the apex of which the sharp carina runs to the base of the antennæ. Wings narrow; anterior cross-vein near middle of discal cell, and opposite the termination of the auxiliary vein; termination of second vein remote from that of the first, the interval as great as that between the terminations of the second and third veins.

The above are the most essential characters, readily distinguishing this genus from *Conops*. Other characters that may or may not be of generic value are the following: Third joint of antennæ very short, scarcely longer than wide, shorter than the first, the latter about one-third or two-fifths the length of the second. Posterior cross-vein straight, and rectangular to both the fourth and the fifth veins. Second segment of the abdomen in the male very slender, somewhat broader in front, nearly as long as the three following segments together; in the female the second segment is cylindrical, but less slender than in the male, only a little longer than the third, the sixth segment as long as the three preceding together, the fifth with a large process below. Proboscis as long as the hind femora. The legs and front, and general structure otherwise, are like those of *Conops*, sens. str.; the wings with their narrow cells present a very different appearance, however. The carinate, non-grooved structure of the face differs from that of all the other genera of Conopidae save *Stylogaster*, a species of which (*S. stylatus* Fabr., which is distinct from both the North American species) was found in the same region with the present species.

TROPIDOMYIA BIMACULATA, n. sp.

♂, ♀. Face with a silvery, or slightly yellowish, sheen, showing the black ground-color in different reflections; a slender median black line on the carina. Vertical callosity yellowish red below, obscurely blackish and luteous, save the narrow margins, which are more yellow; close to the eyes below, a circular opaque black spot. Antennae brownish red, the third joint red; style short, conical, but little longer than the lateral projection. Thorax opaque black, thinly pollinose on the sides, a slender

golden pollinose spot on the inner side of the humeri; humeri and scutellum red; disk of metanotum shining. Abdomen black, the second segment brownish red; sixth segment thickly whitish pollinose; fourth and fifth segments (fifth only in female?) with a narrow yellow hind margin. Legs blackish red; tibiae more red, tarsi black; a silvery spot on the outer distal part of the four anterior tibiae. Wings sub-hyaline, brownish in front, but without a distinct picture. Length 7, 8 mm.

Two males and one female, Chapada (near Cuyaba), Brazil (H. H. Smith). The yellow, intra-humeral spot and posterior abdominal margins appear to be wanting in one of the males.

THREE SPECIES OF MOTHS NEW TO OUR FAUNA.

BY HENRY EDWARDS, NEW YORK.

After all, the geographical range of our fauna, as regards the distribution of insects, is but incompletely marked, and the fact that artificial lines cannot limit the habitat of a species is every day made more apparent. The Florida coast is constantly turning up species properly belonging to the fauna of the West Indies, and Texas and Arizona are as often adding Mexican forms to our list. It is, nevertheless, somewhat strange that three such conspicuous species as those hereafter noted should have only recently appeared within our limits, or at least for so long a time have escaped the watchful eyes of our numerous observers. They may all be cited as examples of the Mexican fauna, though *Pseudosphinx Tetrio* is also found in the W. Indies, and on the continent reaches as far south as the Argentine Confederation. As the insects are probably not known to our local collectors, I have thought it advisable to append descriptions of each.

FAM. SPHINGIDÆ.

PSEUDOSPHINX TETRIO, Linn.

Whole upper surface light gray, the lines and markings brownish black. The basal half line is whitish, with a black dash behind it obliquely. Between it and the median line are some waved brownish indistinct streaks, reaching only from the costa to the middle of the wing. There is a very prominently marked discal spot, and a sub-triangular brown

patch near the apical third of the costa. Behind this is a whitish cloud, followed by a darker shade which cuts the wing directly across from about 16 mm. from the apex to about the same distance from the internal angle. This darker shade encloses, a little from the apex, a heavy black streak, and some shadings of brown. The lower wings are dusky brown, pale along costa, bluish gray at the anal angle, and there marked by a double dentate streak. Beneath both wings are brownish gray, with a submarginal dentate line, an oblique simple median line, and on the secondaries the same lines continued, the marginal one being more distinctly curved. Abdomen brownish black, the segments edged rather broadly posteriorly with whitish. A rather indistinct dorsal gray line, much widest in the male. The thorax is gray, mottled with brown, and from the middle run towards the junction of the abdomen two black lines forming an acute angle, something as in *Sph. cinerea*. Collar transversely marked with black. The shaft of the antennæ is whitish, the pectination pale brown.

Average exp. wings, male, 115 mm.; female, do., 150 mm.

Described from 6 examples in my collection, from Cuba, Brazil, Mexico and Arizona.

The claim of this species to a place in our fauna rests upon the capture of two specimens, male and female, at Tucson, Arizona, by Mr. W. S. Edwards, and one male found in N. W. Texas, and now in the collection of Prof. O. S. Westcott, Maywood, Illinois.

There is no doubt but that this is the *Sph. Hasdrubal* of Cramer = *Macrosila Hasdrubal* of Walker, and it has been so quoted by Mr. Grote in his admirable paper on Cuban Sphingidæ (Proc. Entom. Soc. Philad., 1865, p. 64), in which notice the full synonymy of the species is given. It would seem, however, that in Clemens' description of *Macrosila Hasdrubal* Cr., in Morris's "Lepidoptera of N. Amer.," p. 185, the allusion to the male must have reference to the dark form described by Butler in "Revision of the Sphingidæ," p. 610, as *Pseudosphinx obscurus*. Poey, in his description, speaking of the male, simply says that "it is smaller than the female, with the black lines more distinct." This is correct, but the under surface is not "ash gray," which I take to be the color of ashes of wood or coal, but brown gray, with the bands of a darker shade. The larva is described by Poey (Cent. Lepidopt.) and a translation or adaptation of his description is given by Clemens, loc. cit. A singular error, however, occurs with reference to the pupa. Prof. Poey

is quoted by Dr. Clemens as saying, "the pupa is represented without the detached tongue-case." Now in fact, the pupa has no external tongue-case at all, such as is so noticeable in *Amphonyx Antœus*, *Protoparce Rustica*, in the other species of *Protoparce*, and to a less degree in those of *Diludia*. The pupa of *Pseud. Tetrio*, of which I possess several examples through the kindness of my friend, Wm. Schaus, Esq., jr., is as follows: Pitchy, cylindrical, tapering a little from the junction of the thorax and the head, and more abruptly from the 8th abdominal segment to the tip. It is swollen on the thorax and on the eye cases, while the head is distinctly rounded in front. The covers of the antennæ and the wing bases are slightly marked with transverse corrugations. In the earlier stages of the pupa it has a paler tint, and is marked with some black transverse bands on the upper abdominal segments, which, however, are lost in the ground color as the pupa assumes with age a darker shade. The pupa most nearly resembles that of the genus *Philampelus*. Length 65 mm.; width of head, 11 mm.; width of middle of abdomen, 16 mm.

PHILAMPELUS TYPHON, Klug.

"Cinereous, reddish beneath. Palpi red. Thorax with two dark brown abbreviated stripes. Abdomen with dark brown bands, red on the sides. Anterior wings glaucescent and testaceous mixed, with several blackish-brown sub-trigonate patches. Posterior wings red, with a denticulated band, black, varied with glaucescent, with the exterior margin brown, and the cilia white."—CLEMENS.

This grand insect, of which a specimen taken by the late H. K. Morrison is now in the collection of B. Neumoegen, Esq., is in some respects closely allied to *P. Achemon* Drury, but is larger in size, and altogether richer and darker in color, while the markings are more diffused, and in stronger contrast to the ground color of the wings. A fair figure of it is given in "N. Amer. Lepidoptera," Sphingidæ, pl. 11, by Weidemeyer, Calverley & Edwards, while that by Klug in "Neus Schmett," pl. 3, is remarkable for its accuracy and fidelity to color. Mr. Neumoegen's example was taken in N. E. Arizona.

SYNTOMEIDA EPILARIS, Walk.

Wings, thorax and abdomen bluish black, with a metallic lustre. The primaries have five white spots each, one small at base of costa, one in middle of wing near to basal third, one half way on costa, one smaller a

little behind this, which is cut by the nervule, and one behind the cell also cut by the nervule. The secondaries have one rather large white central spot, almost reaching to the costa. The abdomen has two basal spots very clear white, conspicuous, and its sides have also three clear white spots, the middle one the largest. Tip of the abdomen orange-red. At the base of the coxæ are also white spots. Lower side with the markings repeated. Exp. wings, 50 mm.

Taken in Florida by Mr. C. J. Maynard. Coll. Museum Comp. Zoology, Cambridge. A figure of this beautiful species is given by Mr. Butler in Lepid. Heteroc. B. Museum, Pt. 1, plate 8, figure 5. Mr. Butler gives the locality as Honduras.

DESCRIPTION OF TWO LEPIDOPTEROUS LARVÆ.

BY WM. BEUTENMULLER, NEW YORK.

Botis magistralis, Grote.

Head pale brown, smooth, shining; mouth parts dark brown; cervical shield brown, divided in the middle by the color of the body, which is translucent greenish-white; along the dorsal region two rows of shining pale brown piliferous spots, four on each segment, those on the first segment darker in color. All the spots bear a short light brown hair. Thoracic feet, abdominal and anal legs concolorous with the body. Length 30 mm. Lives singly on *Clethra alnifolia*, in a number of leaves fastened together with silken threads. Pupated July 6th. Imagos emerged July 17th and 18th.

Botis erectalis, Gr.

Head small, jet black, shining; mouth parts whitish. In some individuals of the brood the head is marked with dirty white. First segment dirty white mottled with black. Body above ochreous, with five rows of rather large shining jet black piliferous spots on each side, placed as follows: One row on the dorsal, one on the sub-dorsal, one above, and two below the spiracles, which are black. From all the spots springs a short pale brown hair. Anal plate dirty white, spotted with black. Body beneath sordid white; on the 4th, 5th, 10th and 11th segments two shining black spots, and two minute ones between. Thoracic feet jet black, mottled with dirty white; abdominal legs whitish with three minute

black spots outside and one inside; between the thoracic feet are also a few minute black spots. Length about 23 mm.

Lives socially in a web on Indian hemp (*Apocyum androsæmifolium*, L.) Sept. Spins a thin cocoon, passing the winter in the larval state, and pupates the following spring.

DESCRIPTION OF PREPARATORY STAGES OF DATANA MINISTRA, DRURY.

BY WM. BEUTENMULLER, NEW YORK.

EGG.—Pure white, ovoid, with flattened base, the apex with black dot showing impregnation. Laid in masses, from 25 to 50 on under side of leaf.

YOUNG LARVA.—Head black, shining, second segment orange brown in front, cervical shield black. Body color chestnut brown, with the stripes a little darker; anal clasps and thoracic feet jet black. Length 3 mm.

AFTER FIRST MOULT.—The head jet black, as is also the whole of the second segment and anal segment. Body color now much darker, as are also the stripes, these being almost obscured, except along the lateral region. Thoracic feet black. Length 12 mm.

AFTER SECOND MOULT.—Head black, rather small, second segment yellow except the cervical shield, black. The thoracic feet, abdominal and anal legs, and termination of anal segment, jet black, while the stripes are very clear yellow on the chestnut brown ground. Scattered over the body are also a few short sordid white hairs. Length 20 mm.

Until after this moult the larvæ feed upon the under side of leaf (parenchyma), and do not attack the edges until after the third moult begins.

AFTER THIRD MOULT.—Head jet black, second segment orange, cervical shield black. Body color reddish-brown with rather broad yellow stripes; anal clasps, tip of legs and thoracic feet jet black; under side striped equally with reddish-brown and bright yellow. Length 30 mm.

AFTER FOURTH MOULT.—Head jet black, neck yellow, cervical shield jet black, shining. Body chestnut brown, the stripes bright yellow and equidistant; the feet and anal clasps jet black, abdominal legs yellow

banded with jet black outside. The hairs over the body are now quite long. Length 33 mm.

MATURE LARVA.—Head jet black, sometimes chestnut-red, shining, finely punctured, neck bright yellow, cervical shield dull orange. Body pitchy black with four sulphur-yellow equidistant longitudinal stripes on each side, all being narrower than the intervening spaces, the dorsal space being the widest; anal plates jet black, roughly punctured. Under side also pitchy black with three stripes. Thoracic feet jet black, with their bases yellow; abdominal legs bright yellow, banded with jet black outside. On the 4th, 5th, 10th and 11th segments two yellow patches. The sordid white hairs are few to each segment, though long and most numerous on the lateral region. Length 55 mm.

PUPA.—Pitchy black, wing cases brown and very much wrinkled; head prominent; segments coarsely punctured about the anterior portion, smooth at the junction; cremasters very short, four in number; spiracles ovate, very conspicuous. Length about 23 mm.; width of wing cases 7 mm.

FOOD PLANTS.—Linden *(Tilia)*, cherry *(Prunus)*, pear *(Pyrus)*, quince *(Cydonia)*, walnut *(Juglans)*, hickory *(Carya)*, oak *(Quercus)*, chestnut *(Castania)*, beech *(Fagus)*, hazel *(Corylus)*, hornbeam *(Carpinus)*, birch *(Betula)*. Found from the latter part of July to about the middle of September. Single brooded. Subterraneous.

PREPARATORY STAGES OF CATOCALA RELICTA, WALK.

BY HOWARD L. CLARK, PROVIDENCE, R. I.

EGG.—Shape of flattened sphere. Diameter, 1 mil. Color, brownish slate. There are thirty-six vertical ribs, each alternate one only reaching the apex; and numerous horizontal parallel striations. The eighteen ribs which reach the apex there unite with the horizontal lines, forming an irregular network. Duration of this period 241 to 246 days.

YOUNG LARVA.—Length, 7 mil. Body very slender and geometrid-like, the two anterior pairs of pro-legs rudimentary. The two posterior pairs fully developed. Crawl with a very rapid looping movement. Head ochreous, large and prominent, with minute black piliferous spots. Color

of body light translucent green, in some cases inclining to olive. Five longitudinal lines are faintly indicated in shades of the prevailing color. These markings and the green color becoming more pronounced in the course of a day or two. Small black tubercles, each with a single black hair, distributed somewhat irregularly over the body. A dark oval ventral spot on each segment. Duration of this period five days.

After First Moult.—Length 10 mil. Form much as before, the head perhaps a trifle less prominent. Hairs and tubercles the same, and the anterior pro-legs still undeveloped. Head light straw color, with three or four indistinct wavy brown vertical streaks on each lobe. Immediately after shedding the skin, the body appears of an uniform light straw color, nearly concolorous with the head, with three narrow brownish

longitudinal lateral lines on each side. A few hours later, after eating, the dorsum appears darker; the spaces between the lateral lines light cream color, and the food which has been partaken of shows through in greenish patches in parts of the body. Ventral spots as before. Duration of this period seven days.

After Second Moult.—Length 20 mil. Diameter 2 mil. Head flat and rather large, of an opaque whitish color, shaded with yellowish. The lobes are marked vertically with irregular black and brown lines, interlacing with horizontal lines to form a vein-like design. Top of head marked with black. The body is wrinkled, very slightly constricted at the third segment, is thickest at the ninth, thence diminishing suddenly posteriorly. A dorsal excresence indicated on the ninth segment. Color a uniform greenish cream, with a faint rosy tint at the junctures of the segments, and thickly sprinkled with brownish atoms. Piliferous spots

very minute. The ninth segment presents the appearance of having been stippled with lamp black, and there is a less conspicuous repetition of this marking on the twelfth. Pro-legs greenish, tipped with flesh color, the two anterior pair still abortive. Venter greenish with dark oval spots. A sub-stigmatical fringe of fleshy shreds as observed on larvæ of other species. Duration of this period nine days.

After Third Moult.—Length 28 mil. Body shaped and proportioned much as after the last moult. Ground color the same bluish or greenish cream, thickly sprinkled with brown dots. The same excrescence and black markings on the ninth and twelfth segments. The head is shaped as after the last moult, is opaque white with black markings much as before. Between the markings of the face and the gridiron-like marks above, is a clear white space forming a sort of crescent-shaped mark at the apex of either lobe. Piliferous spots brown, minute. Stigmata concolorous ringed with black. Legs more or less green concolorous with venter. Black ventral spots conspicuous. Towards the end of this period the stigmata appear with a black centre, and the crescent-shaped marks assume a pinkish hue. Duration of this period seven days.

After Fourth Moult.—Length 40 mil. Body rather more flattened ventrally; the hump on the ninth segment is more pronounced and the skin is much wrinkled at the junctures of the segments. The ground color has a more distinctly greenish tinge and the numberless dots with which the body is thickly sprinkled are of a paler yellowish brown. The black markings on the ninth segment extend on to the anterior portion of the fourth pair of pro-legs. The twelfth segment also marked with black as before, and the anal pro-legs streaked with the same. Piliferous spots small and concolorous. Stigmata concolorous, ringed with black. Head very large and prominent, face measuring 4 mil. each way, a trifle broader superiorly. The gridiron markings above are suffused almost to the exclusion of the ground color, and the lateral marblings are heavier black. The mouth parts have a violet tinge. The two anterior pairs of pro-legs still lack their full development. All the legs concolorous with the venter, which is light bluish green. Duration of this period fifteen days or more.

No more moults observed.

Mature Larva.—Length 60 mil. Body same shape as before, thickest from the fifth to the tenth segment inclusive. The black markings on the ninth, tenth and twelfth segments are constant, but in some cases

there are slight black stipplings on other parts of the back. When provided with dried leaves, the larvæ drew them together, forming a very thin cocoon.

CHRYSALIS.—Length 28 mil. ; length of wing cases, 16 mil. ; depth of thorax, 8 mil. General shape as far as the ends of the wing cases, cylindrical, rounded anteriorly and somewhat constricted dorsally at the juncture of the thorax and abdomen. Remainder of the pupa conical, the extremity provided with eight hooks, the longest pair curving outwardly, the next longest pair the same, while the two short pairs at the base curve inwardly. On each of the two segments, posterior to the ends of the wing cases, is a pair of ventral protuberances, which appear to be the rudiments of the posterior pro-legs of the larva. The stigmata are plainly indicated and the abdomen is provided with a few black hairs. Immediately after pupation the color is bright green, which, however, soon changes to a purplish brown, dusted with a whitish bloom. Duration of this period twenty-five days.

It is probable that in their natural state the mature larvæ and pupæ attain somewhat larger proportions than those described above, as the moths which were bred expanded only from 65 to 68 mil., while the parent moth from which the eggs were obtained expanded 80 mil. On the emergence of the larvæ they were offered leaves of white birch, which, however, they did not take to very readily. These were afterwards changed for willow, at the suggestion of Prof. G. H. French, to whom the writer is much indebted for his kindly interest and valuable instruction in this department of entomological research. Upon this food-plant the larvæ appeared to thrive, and some ten examples of the imagines were obtained.

The Society's Collection of Insects sent to the Colonial and Indian Exhibition in London, in 1886, came back in safety, with the exception of two cases, which were somewhat damaged. We are anxious to replace the following species, specimens of which will be thankfully acknowledged, if sent to MR. E. BAYNES REED, London, Ont. :—*Parnassius smintheus*, var. *Hermodur ; Pieris protodice, oleracea, vernalis, virginiensis, frigida rapæ ; Colias cæsonia, eurytheme, philodice ; Terias lisa, nicippe ; Erebu odora ; Zale horrida ; Homoptera edusa, Saundersii, lunata, calycanthata, albofasciata, lunifera, benesignata, duplicata : Ypsia undularis.*

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DESCRIPTION OF THE PREPARATORY STAGES OF COLIAS CAESONIA, Stoll.

BY W. H. EDWARDS, COALBURGH, W. VA.

Egg.—Fusiform, thick in middle, tapering to a small rounded summit; marked by about 18 longitudinal ribs, these being low, narrow, the spaces between flat and crossed by many fine ridges. Color yellow-green. Duration of this stage about four days.

Young Larva.—Length .08 inch; cylindrical, thickest anteriorly; on the ridges of the segments many black points, each with a short black hair; among these are black tubercles, some with long hairs, but most with white clubbed appendages, which form three longitudinal rows on either side, one appendage in the row to the segment; these rows are sub-dorsal, upper and lower lateral; color greenish-white, with a tint of brown; head rounded, a little depressed at top; on the face many rounded tubercles, each with depressed black hair; color pale yellow-brown. Duration of this stage four to five days.

After first moult: Length .14 inch; the ridges thickly beset with black points, each with black hair; among these are small tubercles of same color, mostly on middle of each ridge, with longer hairs; along base a yellowish narrow stripe, and over it, on 3 and 4 each, a rounded black process; another larva showed this stripe only near the close of the stage, and had not the black process; color yellow-green; head rounded, nearly same green as the body, the tubercles and hairs more numerous than before. To next moult four to five days.

After second moult: Length .21 inch; color yellow-green, with yellowish basal band; the processes on 3 and 4 as before, shining, black; head yellow-green, more thickly covered with small tubercles, scattered among which are others, larger. To next moult three to four days.

After third moult: Length .32 to .38 inch; color yellow-green, the band greenish-white; the two processes on 3 and 4 present; on dorsum

of 2 and following segments are very small black rounded processes in cross line and equi-distant, placed on the second ring of each segment; these are very variable in number; one larva had four on 2, and two each on 3 and 4, no others; another had three on 2, one on one side, two on the other, six on 3, two on 4, and these last were larger than any others; six seems to be the full number on a segment, and they vary from that to one, present on some segments and lacking on others, with no apparent regularity; so also the number of lateral processes differs much; one had these on all segments except 2, 5, 9 and 13; as the stage progresses a yellow stain appears in the band on each segment, and at last is often orange-tinted; head yellow-green, a little lighter than body. To next moult about four days.

After fourth moult: Length .6 to .74 inch; to maturity about three days. There was much change in the markings at third moult, but still more at fourth. Some which had been wholly green at this moult discovered cross bands of black and yellow, one or both, and there was much variation in the extent of these bands.

Mature Larva.—Length 1.1 to 1.3 inch; cylindrical, of nearly even thickness from 3 to 11; thickly covered with small black tubercles, each of which gives a short black hair; color yellow-green, light or dark; along base a yellow-white band with a dash of orange on each segment, and sometimes the orange is nearly continuous; over the band on 3 and 4 each a large vitreous black rounded process, from the top of which comes a small hair, and around the base is a ring of black points; some larvæ have additional processes of same character on the succeeding segments, but there is much variation; occasionally all are large as on 3, usually they are much smaller; in one example they diminished regularly from 4 to 12; on dorsum of one or many segments are small black processes on the second ridge, varying from six to one, and often wanting; the same ridge is covered by a black band, sometimes present on every segment, sometimes only on the two or three anterior ones, with broken lines on dorsum or sides of the succeeding ones, frequently however wanting; in many examples the first ridge of every segment is bright yellow, and the complete series of black and yellow bands is often present; but others have the yellow bands broken up on middle and last segments, or lack them on these segments; others have a yellow line instead of band; and often there is no trace of yellow anywhere; some larvæ therefore are

wholly green, some green with yellow bands, some with black bands and no yellow, but more have both black and yellow, with variation as to extent of either; the black bands appeared at fourth moult in examples which showed no trace of them in previous stage, and some larvæ wholly green to end of fourth stage, at the moult took on all the bands; under side, feet and legs pale green; head round, slightly depressed at top, with many fine black points, each with short, black hair; color yellow-green. From fourth moult to pupation about six days.

CHRYSALIS.—Length .8 inch; breadth across mesonotum .18, across abdomen .18 inch; greatest depth .24 inch; shape of *Eurydice;* compressed laterally, the thorax on ventral side prominent, rising to a narrow ridge; the abdomen tapering, conical; the mesonotum low, rounded, with a slight carina, followed by a shallow excavation; the head case produced to a point, a little curved up, with a regular slope on both dorsal and ventral sides, angular laterally; color bluish-green over whole dorsal side, below, the abdomen yellow-green; the wing and head cases dusky green, on the under side a brown crescent; on dorsum two rows of black dots from mesonotum to 12, one to each segment, and a small black spot on either side abdomen; the whole surface except wings dotted or finely streaked whitish.

Another example gave same dimensions; the dorsum yellow-green, ventral side of abdomen more yellow; a brown patch on under side of head case. Duration of this stage seven to ten days.

CAESONIA is a common butterfly in the Mississippi Valley and Gulf States; also in Southern California and to the Isthmus. I myself have never seen it on the wing, and the above descriptions are drawn from larvæ sent me during the season of 1887, by Mr. R. R. Rowley, of Curryville, western Missouri. The first lot of larvæ were received 2nd August, mostly young, and with them eggs which hatched a day or two after. On 11th Aug, there came about twenty larvæ of all stages to mature. Again, on 26th Aug., came eggs and young larvæ, and more on 8th October. The food plant was Amorpha fruticosa. In California it is Amorpha Californica, and I was able to feed the larvæ from plants of this last growing in my garden. The behavior of the larvæ is in all respects as in *Eurydice*, *Philodice* and other species of the genus.

A noticeable feature of these larvæ is the variation in markings,

described in some degree above, the greatest change occurring at the fourth moult.

Boisduval, in Lep. de l'Amer., gives a Plate of *Caesonia*, with larva and pupa, copied from one of Abbot's unpublished sheets. This larva is roughly done, but shows the phase which has a yellow and a black stripe on each segment. The text says the larva feeds on many kinds of Trifolium and Glycine, and also Tagetes papposa.

In the latter part of the summer and in the fall the females of this species are apt to be more or less suffused with rose-pink on under side of hind wing, and about apex of fore wing, and occasionally the male shows something of this at base of hind wing, and around the margins of both wings. Mr. Rowley writes: "The females with red under the wings do not occur at all in the early summer broods. I took scores of butterflies this season in late April, all through May, June and July, and discovered not a streak on one of them. The first examples with red were taken in August. In September they were more numerous, while nearly every female of late October and November were either heavily streaked or solidly red below. I have yet to see a red under-wing of earlier date than August. The feature is surely a seasonal one."

NOTES ON THE GENUS COLIAS.

BY H. H. LYMAN, M. A., MONTREAL.

The discovery by Mr. W. H. Edwards that *Colias Hagenii* is only a form of *C. Eurytheme*, as detailed in the CANADIAN ENTOMOLOGIST for September, while very interesting in itself, serves also to show that this genus is still in a very unsatisfactory state. That a form which so closely resembles *Philodice* that nine entomologists out of ten would take it for that species, should turn out to be a variety of *Eurytheme*, emphasizes Dr. Hagen's statement "that reliable differences between these two well known forms are still a want." Mr. Edwards has also come to the conclusion that *Hagenii* is the same as the form previously named *C. Eriphyle* by him, as detailed in the November number of the CANADIAN ENTOMOLOGIST. A glance at the history of this form will be found interesting.

In 1873, Mr. G. R. Crotch collected a number of butterflies at Lake Labache, in British Columbia, among which were a number of specimens which Mr. Edwards seems to have regarded as *Colias Philodice*, as mentioned in Trans. Amer. Ent. Soc., v., p. 15. Subsequently on page 202 of the same volume, he described these specimens as a new species under the name of *C. Eriphyle.*

In the same place he said that a Colias similar to this had been taken by Mr. Mead, in Colorado, and by Dr. E. Coues, in Montana, and had been referred to by Mr. Reakirt as *Philodice*, but was, he thought, nearer to *Eriphyle* than to *Philodice.* The question now arises as to how these discoveries affect the standing of other so-called species of Colias, for it would seem that some of these forms are like children's tin soldiers set near together, in which if you knock down one, a whole row is laid low.

In But. N. A., vol I., plate 15, *C. Eurytheme* var. *Keewaydin* is excellently illustrated as a distinct species, as it was then believed to be by a number of eminent entomologists, and one figure—No. 7—depicts a greenish-yellow form with rather pale margins, which is certainly strikingly unlike the ordinary type of *Keewaydin*, but which was believed by Mr. Edwards to be merely a variety of that form. In the text, page 50, it is described as follows :

" Variety A. ♂. Upper side pale yellow with a very slight tinge of orange on disk of primaries ; sometimes wholly without orange and then uniform lemon yellow ; the marginal borders also very pale (Fig. 7.) "

On page 51 the following extract from a letter of Mr. Henry Edwards is given : " I may notice that the flight of the new species is much more rapid and varied than that of *Eurytheme* ; * * * that the only variety which appears in the latter is in the case of the albino female, while the male of the new species is constantly subject to run into the lemon yellow variety, which, however, is rarely so well defined as in the specimen I send you." [Figured in plate.]

Subsequently Mr. Edwards ascertained that *Keewaydin* was only a form of *Eurytheme*, as was also *Ariadne*, which had been described as a distinct species in 1870, and he accordingly published in Part vii. of second volume of But. N. A. (pl. 21, pp. 103–116) a very full account of *Eurytheme* and its forms *Keewaydin* and *Ariadne.*

In the course of this most interesting account he said : " It *(Eurytheme)* occupies with *Philodice* the whole of the United States and

much of British America, and like that species, which it resembles in every respect but in color, it is subject to great and extreme variation, there being no feature whether of size or ornamentation that is not unstable."

At the close of this notice he said (page 116): "The butterfly figured on Plate of *Keewaydin*, in vol. i., as No. 7, supposed to be a variety of that species, is regarded by Mr. Henry Edwards as distinct, and has recently been described by him as *C. Harfordii*."

C. Harfordii was described from seven males by Mr. Henry Edwards, in 1877, in Proc. Cal. Acad. Nat. Sci., and at the same time *C. Barbara* was described from two females, but subsequently he came to the conclusion that they belonged to the same species, in which opinion Mr. W. H. Edwards acquiesced. In "Papilio," iii., p. 160 (1883) Mr. W. H. Edwards described *Colias Hagenii*, and said of it that it was close to *Eriphyle* and lay between *Phliodice* and *Eurytheme*, "the four species making a sub-group."

In CAN. ENT., xix., p. 174, Mr. Edwards said: "*Hagenii* is known to fly throughout the Rocky Mountain region, from Colorado to British America. * * * and I think it probable the yellow form accompanies the orange over much of the territory occupied by the latter. On the plains to the east of the mountains these would have been regarded as *Philodice* by collectors. The yellow male figured in But. N A., vol. i., on plate of *Colias Keewaydin*, fig. 7, is *Hagenii*, a very small example."

Now if this same much abused butterfly, known as fig. 7, is both *Harfordii*, of which, as I have mentioned, *Barbara* is a variety, and also *Hagenii*, and if taken east of the mountains would be regarded as *Philodice*, and that *Hagenii* is *Eurytheme* and also *Eriphyle*, it must follow not only that *Eurytheme*, *Eriphyle*, *Hagenii*, *Harfordii* and *Barbara* are one and the same species, but also that it becomes extremely difficult to separate *Philodice* from the same group. In connection with this it should be remembered that at least two well marked specimens of *Eurytheme* have been taken in this Province, one, a female, at Quebec, by the late Mr. Bowles, and another, a male, at Montreal, by Mr. C. W. Pearson, and that specimens of *Philodice* slightly suffused with orange do occasionally occur.

I am, however, not prepared to follow Dr. C. V. Riley in his suggestion that these two forms should be united.

The December number of the CANADIAN ENTOMOLOGIST contains another paper by Mr. Edwards announcing a further reduction of species in this genus by the recognition of *C. Edwardsii* as a variety of *C. Alexandra*. This reduction will, I venture to think, be followed by others, which will considerably curtail our list of species in this genus, for in view of all these discoveries it becomes impossible to believe that *Occidentalis*, *Chrysomelas*, *Emilia*, *Interior*, *Scudderii*, *Pelidne*, *Palæno*, *Chippewa* and *Boothii* are all distinct species.

It would of course be rash to try and indicate in what way the reduction is likely to take place, but I am inclined to believe with Dr. Hagen that *Emilia* will prove to be a variety of *Alexandra*, and that *Chippewa* will be united with *Palæno*.

There are, of course, several well-marked forms other than those above mentioned which will probably maintain their positions as distinct species, as for instance *Meadii*, unless it should prove to be a variety of *Hecla*, as Strecker has suggested; *Christina*, which I believe to be thoroughly distinct, but I do not think that the name *Astræa* should be retained at all, as I have a ♀ supposed to be that form which I obtained from Mr. Gamble Geddes, whose specimens were determined by Mr. Edwards, and which agrees exactly with what I consider the typical orange female of *Christina*; *Nastes*, from which *Moina* seems to be distinct, but may probably prove to be a variety, and *Behrii*, which is certainly distinct from any other American species.

Unfortunately some of these species are only found in very remote localities, and it will, I fear, be many a long day before their life histories are worked out, if indeed, of the arctic ones, they ever can be. Let us, however, hope that the enterprising and hardy race which will result from the colonization of our mighty Northwest Territories may produce scientists who will yet push their way into the arctic regions of this continent in their search after knowledge, and succeed in wresting nature's secrets from her.

PREPARATORY STAGES OF CATOCALA DESPERATA, Guen.

BY G. H. FRENCH, CARBONDALE, ILL.

Eggs.—Diameter, .04 of an inch; low conoidal, the edges of the base rounded; striated, fifteen of the striæ reaching the micropyle, sixteen more that do not reach the apex, though but few of these are only half length; shallow transverse striæ. Color dull brownish olive. Duration of this period 201 days.

Young larva.—Length, .15 inch; cylindrical, slender, shape like others of the genus, a looper from the abortion of first two pairs of prolegs. Color of dorsum and head smoky, the head the darkest, pale between the joints; sides a little paler than the back, with three fine dark red lines. Towards the last of this stage the color is more of a whitish olivaceous with a slight pinkish tinge, and the head and top of joint 2 brownish. Duration of this period 10 days.

After 1st moult.—Length, .35 inch; shape much as before. Color, purplish black; four white stripes tinged with the ground color, the two upper blending on joint 2, the lower situated below the stigmata; venter pale with purple black spots in the middle of the joints; head striped with broken whitish lines; thoracic feet pale. Towards the last of this stage the black stripes are separable into a paler center and a darker border line; the pale a little lilac tinted. Duration of this period 7 days.

After 2nd moult.—Length, .85 inch. Colors much as before, four dark and five light stripes, the pale of the dorsum making a pale stripe, each stripe double; the pale stripes are lilac color, but the two dark stripes on the dorsum have prominent darker patches in the dark bordering lines on the posterior part of joints 4 and 5, and some on the joints back of these, being a spreading of these lines towards the centre of the body, so that between the two there is only a fine lilac line. Piliferous spots black, but so small as to be scarcely perceptible; head about as during preceding stage; venter with a prominent black patch on middle of each joint. Duration of this period 3 days.

After 3rd moult.—Length, 1.35 inches. Developing more into the usual Catocala larva shape, slightly flattening and fusiform. Striped as before, but paler; ground color, pale lilac; the bordering lines to the stripes black, broken into dots and short bars, the central part of the stripes mottled with black, the mottling in the dark stripes heavier than

in the light stripes, the one on each side near the subdorsal region with the black patches on the posterior part of joints as before, the patch on joint 5 filling the whole stripe, the next a little pale in the centre, those back of joint 6 a little darker than the anterior part of the joint in the same region; between the stripes a pale red line; piliferous spots small, orange; hairs gray. Head dull pale purplish red, marked longitudinally with yellowish white broken stripes, more yellowish towards the mouth. Lateral fringe white, well developed. Legs white, mottled with pale purplish red. Venter white, with large black patches on all the joints. Duration of this period 5 days.

After 4th moult.—Length, 1.60 inches; lateral fringe long, profuse, reaching the ends of the prolegs; head oblique and flattened slightly as in other species. Marked and colored much as before, but more of a pinkish shade. Ground color pale lilac, the stripes as before, even to the arrangement of the black spots on the dark subdorsal stripes; the dark stripes are made dark by mottlings that are mostly black dots, the light stripes are equally mottled, but the mottlings in the centre are dark reddish purple; in the paler edges—being the dividing lines of the preceding stage—is a line of purplish red dots; the dark part of the pale stripes is narrower than the dark stripes, though this dark part and the pale bordering line are altogether wider than the dark stripes. Joint 9 is not elevated, but is black shaded on posterior part, the shading extending down the sides and into the anterior part of joint 10. Piliferous spots orange, their bases the ground color; those on joints 5 to 13 larger than on joints 2 to 4, each tipped with a short black hair. Head purplish gray, marked with dull white stripes that are made up of dots, some orange spots on the vertex with a black hair in the centre of each, these orange spots in line with the dark subdorsal stripes, the spots contiguous so as to make a short line. Lateral fringe of the same color as the body ground color. Venter white, black patches on all the joints Duration of this period 11 days.

After 5th moult.—Length, 1.90 inches. Color and markings about the same as before, a pale lilac ground color with stripes composed of black dots giving a grey appearance, the ground color of the dark stripes being a little darker than that of the light, the light and dark stripes being now nearly the same color; instead of a black patch in the dark stripe, each side of the dorsal stripe between joints 5 and 6, and 6 and 7,

there is a patch of clear pale olive, without black dots; the dark stripes on posterior part of joint 9 olive tinted, giving the joint a darker shade. Head striped longitudinally with dull lilac and white, the latter broken and irregular; the top has the lilac replaced by black, with the orange dots of the preceding stage present; a short black stripe on each side from the clypeus. Venter white, the joints bearing legs with black patches tinted with orange, the others with orange patches. Piliferous spots the ground color, but a little rose tinted.

MATURE LARVA.—Length 2.50 inches, width of middle of body .30 inch, of head .20 inch; depth of middle of body .25 inch, of head .15 inch. Color characters the same as at the beginning of period; the three anterior ocelli black, the three posterior brown. Duration of this period 15 days.

CHRYSALIS.—Length from .90 to .95 inch; lateral diameter, through joint 5, .33 to .35 inch; dorso-ventral diameter, through the same joint, .28 to .30 inch; the cause of the difference being a lateral expansion of the wing cases; only a slight dorsal depression on joint 1 (referring of course to the abdominal joints); length of tongue and wing cases .60 to .65 inch, both extending to posterior part of joint 5; from joint 5 tapering regularly to the posterior part of the terminal joint, this ending abruptly in the cremaster; anterior part rounded, this and the tongue and wing cases moderately corrugated or wrinkled; abdominal joints punctured; the whole covered with a white or glaucous secretion. Duration of this period 28 to 30 days.

In this species, as in most I have bred, the eggs continue to hatch for several days after the first ones emerge from the shell, these later specimens being so much later in their pupation and in their other changes, when the hatching is not too long delayed. In some cases these belated examples are weaker than the earlier ones, and either die before reaching maturity, or produce smaller or imperfect imagines. For these reasons I have given the changes and characters of the earlier individuals. I believe, however, that in the woods the delayed hatching produces the late specimens that are to be found in good condition in September and often later.

The eggs from which these observations were made were obtained October 29, 1886, by confining a dilapidated female with hickory bark and leaves, the supposed food plant. They began to hatch April 21, 1887.

when the hickory leaves began to expand. This would give the egg period 201 days. They began to spin June 11, giving a larval period of 51 days. With a pupal period of 28 days, we have a period of 79 days from the egg to the imago, or 280 days from the egg to the same. It is evident from my date of obtaining the eggs that they were obtained from one of the latest specimens, and that eggs from one of the earlier moths would add one or two months to the egg period, as there is evidently only one brood in a season of any of our species of Catocalæ.

The food plant, as given before, is hickory. When ready to spin they fastened leaves together in the breeding cage, preferring seemingly the dry leaves under the fresh food. Several spun under a leaf lying on the dirt in the bottom of the box, fastening bits of sand together for the bottom of the cocoon and this to the leaf. These points would seem to imply that they do not spin on the tree, but in the dry leaves under the tree on the ground. This is further corroborated by several years ago finding a chrysalis in leaves on the ground under a hickory tree, that produced *C. Flebilis*. The cocoon, like the other species, is but slight, with the hooks of the cremaster fastened into the posterior end.

DESCRIPTION OF A NEW HEMILEUCA.

BY W. G. WRIGHT, SAN BERNARDINO, CAL.

HEMILEUCA CALIFORNICA, n. s.

Expanse, ♂, 2.40–2.50; ♀, 2.85–2.90. Head black. Antennæ, ♂, stem brown, pectinations black; ♀, wholly brown. Prothorax white. Patagia white in front, overlaying longer hairs of white and black. Thorax black, with tufts of rust-red hairs behind the patagia. Abdomen black, with a few scattered white hairs toward anal end, and with white or sometimes yellow hairs in segmental spots on sides beneath; ♂ with large anal tuft of rust-red, ♀ without tuft, but tip is hoary with short hairs of sordid white. Legs—femora with long red and black hairs, tibiæ with fewer hairs of white and black. Wings, above and beneath the same; costa dense black to apex, base dense black, at length becoming thinner, outer margin black and like the intermediate white portion, sub-diaphanous.

When quite fresh the wings are clear white and black, and rather opaque, but with exposure speedily become sordid, yellowish and less opaque. Veins all are honey color. Discal spots thin black, touching the costa, but separated from black base, and yet more widely from dark margin; at the cross vein in centre is the lunule, narrow, obtusely angled, the angle clean cut and pointing toward the head. Discal spots on secondaries small, black, never with any lunule or central mark whatever. Habitat, Southern California. Types in author's museum.

This species has heretofore been run in with *H. Nevadensis*, Stretch, but must be separated because of the red tufts on thorax, the white spots on abdomen beneath, the color of the nervules across the black margin, the angled lunules on primaries and absence of lunules on secondaries, in all of which the differences are persistent and without intergrades. Indeed, there appears to be as great difference between *H. Californica* and *Nevadensis*, as between *Nevadensis* and the Eastern *Maia*.

NOTES ON THE LIFE HISTORY OF HEMILEUCA CALIFORNICA.

This insect is quite local, being found in comparatively few places, but is fairly abundant in such localities as it frequents. Like many other species of Lepidoptera, it is often abundant one year, and nearly wanting the next. This present season it has been more scarce than I have ever before found it.

It is first seen on the wing in the latter part of October, males and females appearing at about the same time, and it continues about three weeks. The flight is labored and clumsy, so that they often fly against sticks or twigs, yet vigorous and sustained. It flies only in the heat of the day, and by three o'clock, or at the first whiff of cool afternoon air, it hangs up for the night. The line of flight is undulatory, with a wavy up and down motion, and slow, so that it is very easily taken in the net, or it may be often caught in the hands.

The insect does not feed at all, nor drink, but spends the whole time of its few days of life in the business of reproduction solely; its large body contains sufficient nutriment to sustain it a sufficient length of time to enable it to fulfil its destiny. They are rather handsome when fresh, but a clumsy flight among weeds and bushes speedily ruins all good looks. The male is gay with his showy red anal tuft, and his deeply pectinated antennæ show off beautifully as he flies slowly past with them gracefully arched in front of him. If caught when fresh, he flaps his

wings stiffly together over his back, and curling his anal end round under his thorax like a caterpillar, remains rigid and immovable; but if he be old and worn, he is likely to struggle continuously for liberty. The female has similar habits.

Copulation takes place as soon as the female emerges, often, and perhaps usually, before her wings are developed sufficiently to enable her to fly. The emergence is from the ground, and as she climbs up some grass stem or weed, shaking out and developing her wings, her presence becomes known to the males, who cluster around, on the wing and on foot, fluttering up blunderingly and with clumsy efforts to touch her with their antennæ. And here occurs a most singular thing, that in many instances, as soon as the male actually touches the female with his antennæ, he becomes alarmed and instantly flies off in precipitate flight, dismayed and demoralized, and does not return. But there are plenty of others left, and they crowd around, and it is not long before the right one arrives and speedily becomes attached, when in a little while all the other males fly away and leave the pair in peace.

The next business for the female is to lay her eggs. She flutters about the willow twigs a few feet above the ground, and selecting a suitable twig a line or two in diameter, catches hold with her claws, and hanging suspended, bends her ovipositor up to the twig and deftly places the eggs in a solid ring all round the twig. She commonly begins to oviposit in the afternoon, and continues hanging in the same place all night, placing eggs occasionally as they mature. When thus engaged in ovipositing, if she be annoyed or roughly interfered with, she flaps her wings violently back like those of a butterfly, and remains sullenly immovable. The males, becoming weary with their heavy flight, frequently stop to rest by hanging on a twig or leaf, looking very much like a female ovipositing. He, also, if picked off in the fingers, suddenly flaps his wings back forcibly, making no effort to escape, except that probably he will exude upon the captor a drop or a fine stream of vile fluid, which seems to be his chief weapon of offence and defence. When at rest, or ovipositing, the wings lie down over the body the same as do the wings of most moths, but when caught they throw the wings back and curl the abdomen around under the thorax, without further effort in self-defence.

The eggs hatch in the spring as soon as the leaves have grown sufficiently to afford them food; they are gregarious when young, but become

solitary toward maturity. They feed chiefly upon white willow, *Salix lasiolepis* and *S. lasiandra*, or the smooth-barked willow, like the Eastern golden willow, and also upon the cottonwood, *Populus Fremonti*. I have also found their eggs upon Artemisia, "Roman wormwood," but I do not think that plant can be a normal food-plant. The larvæ are yellowish, very much like those of *Vanessa Antiopa*, but are larger and lacking the red dorsal tufts of the latter; are spiny, and apt to be annoying if they fall upon a person's neck as he goes among the trees where they live, wherefore they are locally known as "the poisonous caterpillar." At maturity they come down the stem of the willow, and pupate in the ground or among the rubbish. Such as I have had to pupate in confinement, do so without making any sort of cocoon, but with chrysalis naked, like that of a butterfly.

STRAY NOTES ON MYRMELEONIDÆ, PART 4.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

(Continued from vol. xix., page 217.)

Gen. nov., BRACHYNEMURUS.

Tibiæ calcarate; spurs as long as the two basal joints, or a little shorter; antennæ longer than head and thorax, stout, cylindrical, a little thicker to tip, which is bluntly pointed, but not clavate; palpi about equal, last joint of labials (except in *B. longipalpis*) with the basal two thirds inflated, fusiform; abdomen long, slender, about half longer than the wings (male); or as long as the wings (female); male appendages very short, less than half the length of last segment, stout, cylindrical, very hairy and spinous; a very small ventral triangular plate below and between them. Female superior parts split, with numerous very strong spines; a short flat appendage each side of the ventral part. Wings long, bluntly pointed, hind wings narrower; costal space with two series of areoles, or with one series, and the apical transversals forked.

1. *Brachynemurus longicaudus* Br.

Burm. II., 994, 8; Ramb., 386, 2, pl. 12, f. 3; Walk., 329, 46; Hag. Syn. N. A., 227, 4.

Body luteo-fuscous, hairy, very slender; head very small; antennæ longer than head and thorax, strong, thicker to tip, brown, somewhat reddish before the apical part; vertex elevated, with a split in the middle anteriorly, luteous, with a transversal blackish band; another larger transversal blackish band, in which the antennæ are inserted, is notched below; face luteous, with a faint black longitudinal line. Palpi short, feeble, pale luteous; maxillary cylindrical, apical joint brown; labial not longer, paler, last joint fusiform, its basal half brown; prothorax slender fuscous, variegated with gray, two pale gray spots near the front border, and some laterally; mesothorax and metathorax fuscous, with yellowish marks: abdomen very slender, a little less long than twice the length of hind wing, hairy, fuscous, basal half above with a yellowish band, a little enlarged on the articulation, and divided by a median fine black line; segments 2 to 5 of equal length, 7 a little shorter; appendages blackish, fuscous, with long black spines and hairs; compressed, about one fourth the length of the last segment, straight, after the basal half narrowed; a short triangular yellow plate below; legs pale, densely sprinkled with black, with long bristles; tip of tibiæ, third joint of tarsi on tip, fourth joint entirely, and tip of last joint black; spurs light brown, of the fore legs nearly as long as the two basal joints; wings narrow, hyaline, venation close, two series of areoles in the costal space of front wings; transversals in the costal space of hind wings furcate in the apical half; veins brown, interrupted with white; pterostigma small, white; front wings rarely sprinkled with fuscous, with three obsolete dots along the submediana. Male.

Length of body, ♂ 38 to 45, ♂ 27 m.m.; expanse al., 44–48 m.m.

Hab. Georgia, Burmeister's type with label in his handwriting, from Savannha, collect. Winthem; two males from Millin, Scriven Co., Ga., July, 1876, coll. by Morrison; two males from Florida, Cedar Keys, June 4, and Crescent City, by Hubbard; one male Amer. merid., out of the late Dr. Schneider's coll. (perhaps this locality is erroneous).

Burmeister, l. c., quotes a female: "Abdomine alis æquali; fusco hirsutiusculo; length 25 m.m." When Winthem's collection came in my hands, this female was wanting. Formerly I had this species determined in my publications as *M. abdominalis* Say; I believe now this species to be different.

Mr. Taschenberg (Zeitschr. Giebel., vol. 52, p. 213) describes the types of Burmeister in the Halle Museum of *M. irroratus*, from S. Carolina, Zimmermann. The two females belong evidently to *M. longicaudus*. Though I have no female of this species before me, the identity is proved by Taschenberg's description and by the mention of the three obsolete dots along the submediana of the front wings. There can be no doubt that these females are the types of *M. irroratus*, as in the Halle coll., and in Burm. Hdl., No. 11; but I repeat that the male described by me has on the pin the label "*irroratus* Burm." in his handwriting. As the name *irroratus* is pre-occupied, no change is needed.

2. *Brachynemurus nebulosus* Ramb.

Myrmeleon nebulosus Ramb., 387, 4; Walk., 33c, 48.

Very slender, villous; head small, blackish; face dull yellowish, with a fine transversal line before labrum and a longitudinal line, black; below the antennæ an incurvate black line; vertex elevated, not cut sharply in front, more rounded, grayish-fuscous, as well as the occiput, with some blackish not well defined spots; antennæ as long as head and thorax, strong, cylindrical, rather enlarged to tips, rufo-fuscous, articulations faint yellowish; palpi dull yellowish, the labials about as long as the maxillary, last joint longer, cylindrical, its basal half a little thicker and darker. Prothorax narrow, blackish, with three ill defined yellowish bands, beginning on the front margin; the median very short, split, the two others running together before the wings; meso- and meta-thorax blackish, each above with a yellow geminate spot and some marks near the wings; on each side above the legs some yellow stripes. Abdomen of the male very slender, much longer than the wings, villous, blackish; basal half above with a pale longitudinal band, interrupted on tip of segments; apical half black with a pale basal dot, and sometimes another one in the middle; appendages about half the length of last segment, with long black hairs, compressed, the base enlarged to reach the dorsum; below and between them a very short and small triangular whitish plate. Abdomen of the female as long as the wings, compressed on the more enlarged apical third; colored as the male; genital parts in the last segment above yellow, split, surrounded with strong black bristles; below two short thick black appendages. Legs short, pale yellow, much sprinkled with black, with white and black hairs; tip of tibiæ and of all joints of tarsi (the fourth entirely) black; spurs brown, as long as the two basal joints;

claws brown, as long as the spurs. Wings narrow, with fringes on hind margin, which is very little emarginate before tip; hyaline; venation pale interrupted with brown; base of numerous forks and around many transversals brown; front wings with many large rusty-brown round spots along the mediana and submediana; apical half of costal space with two series of areoles; hind wings similarly spotted, but without the large rusty-brown spots.

Length of body, male, 38 to 45 m.m.; female, 28 to 31 m.m.; exp. al., 40 to 50 m.m.

Habit., Millin, Scriven Co., Georgia; July, Morrison. I have before me two males and three females; it is a very pretty species and doubtless Rambur's *M. nebulosus*.

I had accepted this species to be *M. contaminatus* Burm., which is, with a short diagnose, only mentioned by his *M. irroratus*. Mr. Taschenberg describes a female, which is not labeled, out of Burmeister's collection. This female belongs doubtless to *M. conspersa* Rbr.; he calls the spurs of the anterior legs shorter than the first joint of tarsi, but these are probably spines. If this is really the type of Burmeister, and I have no doubt of it, the name has to be dropped, as it belongs to *M. conspersa*.

3. *Brachynemurus versutus* Walk.

Myrmeleon versutus Walk., 331, 51; Hag. Syn. Neur. N. Amer., p. 238, No. 8.

Black, very slender, faintly villous; head narrow; front shining, yellow, above a broad black band, notched in middle below, narrowly yellow around the eyes and around the base of antennæ; a black longitudinal line from the middle of the notch to the epistom, where it is enlarged and united with a larger transversal black band (which is sometimes divided into four spots) on the epistom; labrum black shining with yellow side-margins; vertex elevated, rounded, black, with a transversal yellow band, interrupted in middle, and a posterior one, representing a larger yellow spot on each side, and a smaller middle one, a little before them; antennæ of male much longer than head and thorax, about 10 m.m.; of female shorter, about as long as head and thorax, 7 m.m.; long, filiform, a little thicker to the tip, bluntly pointed; those of female a little more enlarged on tip; blackish-brown, the two basal joints shining black; palpi yellow, apical joint of the maxillary black shining, and the two foregoing black

externally ; labials scarcely longer, last joint shining black, except at extreme base, long, a little inflated, but the apical half thinner. Prothorax yellow, as broad as long, a little narrower in front, with two broad black stripes, each of which includes a yellow dot in front, and another behind them ; meso- and meta-thorax yellow with two interrupted black longitudinal bands and some spots ; sides below the wings black with yellow stripes and dots. Abdomen of male very slender, much longer than wings, 40 m.m., blackish-brown, shortly villous, three basal segments dull yellowish above, with a fine dorsal median black line, the other segments black, with a fine yellow dorsal line ; appendages testaceous, more yellowish at base and tip, with long black hairs and bristles, long, but shorter than the segment before last, straight ; between them below a very short triangular yellow plate ; abdomen of female as long as wings, stouter, enlarged and compressed to the tip ; same coloration ; genitals yellow ; upper part inflated, with many strong black spines ; below two very short cylindrical yellow appendages. Legs yellow, largely sprinkled with black, with numerous hairs ; tip of tibiæ and of all joints of tarsi black ; spurs brown, as long as the two basal joints ; claws brown. Wings hyaline, thickly and almost equally covered with small brown dots, which are all at the base of the small forks, and on base and tip of the transversals ; veins brown interrupted with white ; pterostigma larger, bright yellow ; apical half of costal space with forked veins ; wings around and on the veins hairy.

Length of body, male, 42 to 46 m.m.; female, 28 m.m.; exp. al., 55 to 60 m.m.

Hab., San Luis, Mexico ; September and October, Dr. Palmer ; three males and six females. I think there is no doubt that this is the species described by Walker after one male.

NOTE ON LATE PAPERS ON THE NOCTUIDÆ.

BY A. R. GROTE, A. M.

My last paper in the Proceedings of the Am. Philosophical Society, Philadelphia, contains a number of typographical errors, the most serious of which I corrected subsequently by an "errata" in a later volume, not

being able to see the proofs. This paper reviewed the main and first two groups, leaving the Fasciatæ (*Catocalinæ* Pack.) and the Deltoids unrevised. I would recognise five very unequal groups both in structural value and extent. Adopting Packard's nomenclature so far as he went (this author excluded the Deltoids at the time), we may call these groups subfamilies, but in Europe my *Thyatiridæ* and the *Brephidæ* are taken out of the *Noctuidæ* as distinct families. We have thus the following classification, which can only be changed by throwing all five together as subfamilies, which does not alter the matter in reality. The larvæ of the *Thyatiridæ* are, however, almost Notodontiform.

(1). Family THYATIRIDÆ.
(2). Family NOCTUIDÆ.
  (a) Sub-family *Noctuinæ*.
  (b) Sub-family *Catocalinæ*.
  (c) Sub-family *Deltoidinæ*.
(3). Family BREPHIDÆ.

The groups I have recognised and named may be regarded as tribal with the ending *ini*, as *Hadenini*, *Orthosiini*, *Heliothini*, *Stiriini*, *Scolecocampini*, etc. The Deltoids contain two such tribes, viz , *Herminiini* and *Hypenini*. My object has been to bring the classificatory terms to correspond with those in Coleoptera as used by Leconte.

In my last descriptional paper in CAN. ENT., the genus and species (8) *Phiprosopus callitrichoides*, is omitted accidentally on page 132, vol. xv. My work is now to bring our genera into closer agreement with European genera by comparison of types, as I say on page 131 of the same volume, to which I direct the attention of students.

CORRESPONDENCE.

CALLIMORPHA.

Dear Sir : I am sure that Mr. Lyman's article on Callimorpha, with its excellent plate, has given an impetus to the study of this genus. It will be no question with the Derivatists that these forms are all descended from a single species. The test by breeding from the egg must now decide whether these forms have each an independent cycle of its own or are interdependent still. The test for *species* remains to be applied to

them. As yet we can only compliment Mr. Lyman's tact in sorting the moths. I had the opportunity of examining a lot of *Clymene*, taken in the vicinity of Buffalo, and I came to the conclusion that it was possible that the yellow and white forms are yet interchangeable. All the white forms show traces of yellow on costa or body parts. I also possessed an example of var. *albanchora* m. (corresponding to Lyman's fig. 5), which very nearly resembled *interrupto-marginata* as to the brown markings, but on a white ground. I believe it is Dr. Packard who first drew attention to the interesting fact that our Callimorphas are buff and white, corresponding to the prevailing colors of our *Arctiinæ*, whereas the European species is gaudily tinted, agreeing with the brighter European representation of the sub-family of which it is a member. Like *Datana* and *Hemileuca*, *Callimorpha* is an example of a generic group in which the species or forms are more nearly related than usual, and is thus one of those assemblages which I have called *Progeneric*.

A. R. GROTE.

NOTES.

MR. ALFRED WAILLY, Tudor Villa, Norbiton, Surrey, England, is anxious to obtain specimens of the wild Silk-worms of all parts of the world for exhibition in the Department of Sericulture at the Paris International Exhibition of 1889. In order to make the exhibition as complete as possible, he wishes to obtain specimens of live cocoons, in large quantities or small, with names of food-plants for each species, whenever possible, and also specimens of the moths; any specimens sent will be purchased or exchanged, as desired. Small samples (in strong tin or wooden boxes) of live cocoons and specimens of moths, can now be very rapidly and safely sent by Sample or Parcels Post; to avoid the risk of emergence during transit, cocoons should be sent before the end of March. The production of mulberry silk has been so deficient of late years, it is most important that efforts should be made to utilise as many as possible of the wild Silkworms, many of which produce silk of great strength and beauty.

PROFESSOR SAMUEL PIERPONT LANGLEY, LL. D., has been appointed Secretary of the Smithsonian Institution at Washington, to succeed the late Professor Spencer F. Baird.

CHANGE OF ADDRESS.—Mr. C. H. T. Townsend, from Constantine, Mich., to War Department, Adjutant General's Office, Washington, D. C.

The Canadian Entomologist.

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DESCRIPTION OF THE PREPARATORY STAGES OF PAPHIA TROGLODYTA, FABR. (GLYCERIUM, EDW., BUT. N. A., VOL. I, PL. 46; ANDRIA, SCUD.)

BY W. H. EDWARDS, COALBURGH, WEST VA.

EGG.—Nearly spherical, a little higher than broad, somewhat flattened at base and slightly depressed at top; surface smooth; crossed near the top—at about one fifth distance from top to base—by two to four parallel rows of raised points, about 22 in the full circle; these seem to be placed in vertical lines; in some examples the rows are nearer together than in others, and there is often irregularity in the number or position of the points, some of the series wanting, or misplaced, in this last case lying between the rows. Color pale green. Duration of this stage four to five days.

YOUNG LARVA.—Length, at 12 hours from egg, .09 inch; cylindrical, tapering from 2 to 13 on dorsum and sides, the end of 13 rounded; color brown-green; the cross-ridges on each segment studded with small white rounded tubercles, from the top of each coming a short, fine, white hair; there are also four rows on either side of large white tubercles, one to the segment, three above spiracles, a sub-dorsal, mid-lateral, lower lateral, and one below spiracles; each with a short stiff hair; each of the basal row has a half circle of small tubercles, but larger than those over dorsum on its lower side; under side, feet and legs nearly as above, a shade more green; segments 5, 6, 11, 12 are crossed by two or three rows of tubercles; head a little broader than 2, rounded at top, the outline that of a horse-shoe, the front somewhat flattened; color yellowish; across the forehead a broad stripe of brown, within which are two little patches of the yellow ground, one on each lobe, and the stripe bends at right angle and narrowing passes down each cheek; in a curve about the top in front six small tubercles, and near the suture two others which with the second and fifth of the curved row make a cross row of four. Duration of this stage three to five days.

After First Moult.—Length at 12 hours .18 inch; shape as before; color gray-green, the dorsum of 12, 13 discolored brown or blackish, and a sub-dorsal patch of same hue on 8 and 10; thickly covered with fine tubercles as at first stage; the rows of larger tubercles as before, ivory white, bell-shaped, the hair or process from top brown or black; the basal tubercles large, each with its crescent of smaller ones on lower side; head higher than broad, narrowing at upper part, depressed at suture; color of the upper front greenish, over mandibles yellow-white, at the back gray-green; on each vertex a low duplex black process, the outer part larger and higher than the other, each with a black short bristle at top; at back, on either side the suture, a duplex small yellow process and others down the side of face at back; over the front minute tubercles as at first stage, and in addition three large conical white tubercles on either lobe, each three in triangle with base above, so arranged that four tubercles cross the forehead in line. To next moult four to five days.

After Second Moult.—Length at 12 hours .25 inch; shape as before; tuberculated as before; color gray-brown, discolored on posterior segments as before; head shaped as before; the processes on vertex larger, triplex, shining black, two being in line across front, the outer one larger, the third lying behind and between the others; the back and the front face armed as before. To next moult five days.

After Third Moult.—Length at 24 hours .34 inch; shape, armature and color as before; there is much variation in the extent of the black; on one example 6 and 11 were quite black dorsally, on sides of 8, 9, 10 black patches, on sides of 3, 4, 5 paler black; another was pale black on 12, 13, a very little of same on 5 and 6, and the sides of 8, 9, 10 pale black; head as at last previous stage, the front greenish-black, the vertex processes black; of the four cones across front the outside ones were black, the others white, with brown rings at base. To next moult four and five days.

After Fourth Moult.—Length at 24 hours .7 inch; after five days was fully grown.

Mature Larva.—Length 1.3 inch; stout anteriorly, thickest at 3, 4, tapering on dorsum and sides to 13; the end of 13 rounded and the dorsum much curved; color gray-green, segment 2 darker green; usually marked by patches of black on dorsum or sides of segments after 6, but some examples have little, or it is pale colored, and others have none at

all; entire upper surface studded with low rounded tubercles varying in size, but always small, placed on the cross-ridges; these are whiter than the ground color and from each proceeds a very short, straight white hair; under side, feet and legs a shade lighter than the upper, 5, 6, 11, 12 crossed by tubercles; head sub-ovate, depressed at top, the height to the breadth as 8 to 7; color gray-green, thickly covered with tubercles like those on body, small and large; among these are larger ones, three on either lobe in triangle, so disposed as to make a row of four across forehead; these are white, with a brown rim about base, or the inner pair are white, the others black; on each vertex a triplex process as described at fourth stage, black; along the back and sides white processes, of which a duplex or bifid one, taller than elsewhere, stands on either side suture; ocelli black. From fourth moult to pupation ten days. Mr. French, But. East. U. S., p. 228, gives the length of mature larva as 1.55 inch, and probably wild examples are larger than my bred ones.

CHRYSALIS.—Length .65 inch; breadth across mesonotum .38 inch, across abdomen .4 inch; shape much as in Danais *Archippus*, the last segments retracted in same way, so that the abdomen is greatly shortened, and the shape that of a dome; the head case short, narrow at top and bevelled to a sharp, slightly incurved ridge; the sides sloping; mesonotum prominent, carinated, rising posteriorly to a rounded point, the slope to top of head regular, and at about 45°; the depression behind shallow and broad; the dorsal edges of wing cases prominent, the sides excavated; color light green granulated with whitish; the edges of wing cases and top of head case whitish. Duration of this stage nine to twelve days.

Some stages of the larva of this species were figured in Butterflies of N. A., vol. 1, 1871, under the name of *Glycerium*. The drawings were made expressly for me by the late Dr. H. K. Hayhurst, then at Sedalia, Mo. They are before me as I write. The same drawings were used by Prof. Riley, before my Plate appeared, in his paper on *P. Glycerium*, Second Ent. Report, Mo., 1870, and his wood cuts were reproduced in Prof. French's Butterflies of the Eastern U. S., p. 228, 1886. These are the only published illustrations of the life history of any species of Paphia so far as I know, and whatever defects there may be in the figures of the larvæ are common to all three of the works mentioned. The principal figure is that of the mature larva, and in But. N. A. a fair general view of the stage is given. But the peculiar armature of the body and head is not represented, and therefore this figure has very little value. Another

figure shows the beginning of the case, and a third the completed case, and this last is best of the three. The pupa is better than the larva, but does not give the pretty green hue of nature. I intend to give a more satisfactory Plate of all the stages in Vol. 3.

By the kind aid of Prof. Rowley, of Curryville, Mo., I was able to follow the history from the egg, in 1887. Mr. Rowley not only sent eggs at different times, beginning with 15th May, and larvæ of all stages of growth and pupæ so late as August 1, but kept me supplied with the food plant, Croton capitatum. The eggs are laid on Croton monanthygnum also, and these are the only plants known to Mr. Rowley. They are laid usually singly on the under side of the leaf. The young larva, soon after emerging, constructs for itself a perch on which it rests, after the manner of a Limenitis. It is at the tip of the leaf, made by eating away alongside the mid-rib, and using this rib as the base, covering with silk and lengthening by chewed bits of leaf bound and held by the silk. One perch in first stage measured .28 in length, and on it the larva rested with the anterior segments arched, only the pro-legs furnishing the support. But if there be two larvæ on one leaf, the second perch may be made anywhere at the side. After the first moult the perch was lengthened and made heavier by binding it with larger pellets, so that it looked like a string of knobs, and the greatest length I observed was .4 inch. The young larva bears much resemblance in body and head to young *Limenitis Disippus*, but is more like that larva at second stage than the first, and the head with its many tubercles and processes on vertices and at back still more resembles either second or third stage of *Disippus* than the first.

After the second moult, the perch is deserted, and a case is made by covering the upper surface of the leaf with silk, and bringing the edges together. The larva lies at first quite concealed, and eats the base of the leaf. Here the next moult takes place, and the larva then builds a new case, and goes outside to feed, after the habit of the nearly mature *Papilio Troilus*. By the time the fourth moult approaches, the larva is as long as the case, and the head will be exposed at one end and tail at the other, the rounded case being a pretty good fit, rather loose. When in suspension, the attitude is almost circular, and both ends meet and touch. The pupa is often found, Mr. Rowley tells me, attached to a branch of the food plant. There are at least two broods of the imago, and it is the

latter which hibernates. Mr. Rowley calls my attention to a decided seasonal dimorphism in the two broods of the females.

Prof. French gives the localities as the Western States, from Illinois and Nebraska to Texas, the presence of the butterfly no doubt being determined by the presence of the food plant.

SOME OBSERVATIONS MADE IN 1887 ON DANAIS ARCHIPPUS, Fabr.

BY WM. D. MARSH, AMHERST COLLEGE, MASS.

Mr. Scudder, in his "Butterflies," p. 136, says of this species: "It is the longest lived of our butterflies. It leaves its winter quarters later in the season than other hibernating butterflies, and continues upon the wing until July and August, laying eggs all the time, so that the insect may be found in all its earlier stages most of the summer. . . . . Whether or not there is a second brood in New England is doubtful; but the earliest butterflies which have not hibernated may be found in July, so that while the earlier stages are passed rapidly, the perfect insect often lives a full year, mingling on the wing with its own progeny, and witnessing the decay and renewed growth of the plant which nourished it; for the milk-weed dies early, and is not sufficiently grown to support the caterpillars when the first butterflies appear in the spring."

I understand that Mr. Scudder still holds substantially these views of the habits of *Archippus* in New England, and at any rate has published nothing to the contrary.

Early in the summer of 1887, Mr. W. H. Edwards wrote me with the request that I would make a study of *Archippus*. As my college term did not close till June 25th, all my observations before that date were made at Amherst; from June 25th to August 12th, at Randolph, Vt., a hill-town, 37 miles N. W. from White River Junction.

1. Hibernated *Archippus* were observed at Amherst, May 15 and May 21, and recognised as such by their faded and ragged condition. I searched for eggs, but found none. I may say here that at no time after

this, either in Mass. or Vt., did I see an imago that could have been a hibernator.

2. A fresh ♀ was taken at Randolph, July 4th, and another perfectly fresh was seen the same day. This would be the first generation in descent from the hibernator. On 20th July, a larva two thirds grown was taken, raised to pupa, and sent to Mr. Edwards, Aug. 1st. On August 11th, 2 ♂ 1 ♀, perfectly fresh, were taken, plainly of same generation as was the larva of July 20—the pupal period being then but 9 or 10 days. These imagos were in the second generation from the hibernators.

3. On 5th Aug., found a fresh egg at Amherst, where the season would be a week or ten days in advance of Randolph; on 17th and 18th

Aug., two larvæ, evidently by their size of the same generation as the egg of 5th. Continued to find larvæ all through September, the last one on 30th, in all 34 larvæ.

4. From 30th Sept. to 15th Oct., butterflies from pupæ bred from said larvæ emerge. And besides, many pupæ were found in the fields, and the imagos came from them. These butterflies were then the third generation from the hibernators, and individuals were seen on the wing into November. Giving the above facts in a table, thus:

1. May 15th, hibernating female seen, Amherst.
2. July 1st to 7th, imagos of 1st brood from hibernator, Randolph.
3. Aug. 11th to 19th, " 2nd " " " Amherst.
4. Oct. 1st to Nov. 4th, " 3rd " " " Amherst.

I communicated these facts to Mr. Edwards as they were noticed. I cannot see wherein the behavior of *Archippus* is different from that of

any other hibernating butterfly. Nor have I found any evidence of exceptionally long life, or of the old hibernating females being about all summer, laying eggs with their progeny. And of course they do not witness the decay of the food plant, for the milk-weed does not die early, but lasts till frost in October, and will stand pretty severe frost. On 28th Sept., I wrote Mr. Edwards: "We have had two pretty heavy frosts within a week, but the *Archippus* larvæ and more than half the milk-weeds are fresh and vigorous." On 30th Sept., I wrote: "Found the 34th larva this morning. Frosts have not been severe enough to kill larvæ. Most of the 34 have been on young milk-weeds, after the first mowing. Now the fields have been mowed the second time, and this explains why the late brood of the larva and imago may be scarce in some parts of N. England."

On 26th Oct., I wrote: "I now have four pupæ, of which one should give imago to-morrow, and three will wait a week. The pupal period in October, the pupæ being kept in a cool room, is about three weeks. In September, it was of about 15 days duration. Larvæ taken 2nd Sept., pupated 9th to 12th Sept., and the imagos came out 25th to 30th Sept."

I wrote 29th Oct.: "The one pupa has given imago." On 4th Nov., I wrote: "Another imago out this morning, a fine female. I have two pupæ left, and send you them by this mail."

It is plain to be seen why imagos are rare in the fall, and therefore more rare in spring, for there must be more or less loss of them in the winter. In New England quite generally the fields are mowed the second time, and that very late. Thus, while on Sept. 9th were taken nine larvæ in a field near my house from a group of milk-weeds, before larvæ of the same generation could have completed their stages, all the food plants were cut down. So myriads of larvæ must be annually destroyed in New England.

I saw wild *Archippus* flying on the 5th of Oct., again on 13th, in both cases after some frosts, as I have before mentioned. Of course these late flying ones are the hibernators, and liable to be caught any day at that season by cold that would compel them to seek hiding places or else become torpid out of doors.

DESCRIPTIONS OF SOME NEW GENERA AND SPECIES OF CANADIAN PROCTOTRUPIDÆ.

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

The following paper is devoted to the description of new genera and species of parasitic Hymenoptera belonging to the family Proctotrupidæ, collected at Ottawa, Canada, by my esteemed friend, Mr. W. Hague Harrington, to whose liberality I am deeply indebted for sending me these and many other interesting forms in this family now in my collection.

Sub-family CERAPHRONINÆ.

The following table will be found useful to separate some forms closely allied to the genus *Megaspilus* Westwood.

Eyes hairy.
Metathorax spined .....*Megaspilodes* Ashm.
Metathorax not spined.
Wingless, or with rudimentary wings.....2
Winged; a large semi-circular stigma and a stigmal vein.
Mesothorax with three grooves; ♂ antennæ filiform, ♀ flagellate.....*Megaspilus* Westw.
2. ♀ antennæ sub-clavate; ♂ unknown.....*Eumegaspilus*, n. g.
Mesothorax with only a median groove.....*Megaspilidea*, n. g.

Megaspilodes Ashm.

The writer has recently characterized this genus elsewhere. It is at once distinguished from *Megaspilus* Westw. by having a blunt spine, or a bi-forked spine, in the middle of the metathorax. Two species pertain to it, viz., *Megaspilodes armatus* Say, and *M. fuscipennis* Ashm.

Megaspilus Westwood.

(1) *Megaspilus Harringtoni*, n. sp.

Male and female. Length .07 to .10 inch. Black; head and thorax finely reticulately sculptured; abdomen polished black. Antennæ 11-jointed, the scape and pedicel dull honey-yellow, the flagellum brown-black. Legs dull honey-yellow, the posterior femora obfuscated, the anterior and middle coxæ honey-yellow at apex, while the large posterior coxæ are black. Wings sub-hyaline, heavily pubescent, the large stigma and stigmal vein brown. The male differs from the female only in its smaller size, and is readily distinguished by its long, filiform antennæ, the

scape of which at apex and the flagellum, brown; the joints of the latter are about four times as long as thick.

Described from two specimens, male and female.

Eumegaspilus, n. g.

This genus is distinguished from *Megaspilus* Westwood in being entirely wingless or then with rudimentary wings, and by the shape of the flagellum, which is sub-clavate. In *Megaspilus* it is flagellate, i. e., tapers gradually to a point at apex.

(2) *Eumegaspilus Canadensis*, n. sp.

Female. Length .09 inch. Polished black; the head and thorax only showing a delicate, reticulated sculpture under a high power lens. On the head are a few large punctures, particularly on the vertex, two small foveæ or depressions on each side of front ocellus; occiput prominently margined; eyes pubescent. The antennæ are 11-jointed, wholly brown-black; flagellum sub-clavate, the first funiclar joint longer than the pedicel, the others sub-equal but gradually widened, the terminal joint being the longest and thickest. Mesothorax with three grooves. Legs, including coxæ, of a uniform brownish-yellow. Abdomen highly polished with a depression near the base.

Described from one specimen.

(3) *Eumegaspilus Ottawensis*, n. sp.

This species is much like that just described, but it is more slender and more highly polished; the head is impunctured, while the scape at base, the pedicel, the 2nd, 3rd and 4th flagellar joints, and the legs, including the coxæ, are honey-yellow. The rudimentary wings are linear and reach not quite to the middle of the abdomen.

Described from one specimen.

Megaspilidea, n. g.

This genus is at once distinguished from the others by having but one groove on the mesothorax—the median one, the parapsidal grooves not being present; also by the difference in the flagellar joints.

(4) *Megaspilidea minuta*, n. sp.

Female. Length .04 inch. Head and thorax shining black, microscopically, reticulately sculptured. Eyes large oval, pubescent. Antennæ 11-jointed, scape ob-clavate, more than half the length of the flagellum; flagellum sub-clavate, first joint hardly half the length of pedicel, others

short, gradually widened toward tips, terminal joint very large and as long as the three preceding joints combined; scape yellowish at base and beneath, flagellum brown-black. Legs, including coxæ, brownish-yellow. Abdomen highly polished, smooth, excepting a few longitudinal lines near the base; the color above is black, excepting a large orange-colored blotch across the base; beneath, it is wholly brownish-yellow.

Described from two specimens.

Sub-family SCELIONINÆ.

Acolus Forster.

(5) *Acolus Canadensis*, n. sp.

Female. Length less than .03 inch. Black, shining, sparsely pubescent. Antennæ black, excepting the scape at base; the first and second funiclar joints are about as long as thick, third and fourth smaller and not as long as wide, club very large, joints not well separated. Scutellum sub-lunate. The legs, excepting the honey-yellow knees, are dark red. Abdomen broadly oval, the second segment occupying most of its surface, first segment with a transverse depression occupying nearly its whole width, striated and with a fringe of white hairs at base.

Described from one specimen.

(6) *Acolus borealis*, n. sp.

Female. Length .03 to .04 inch. Differs from *A. Canadensis* only in being relatively more robust, and in being distinctly, finely, confluently punctate; the lower part of face and the abdomen alone being smooth and shining. The antennæ are dark reddish brown. Legs uniformly red, while the abdomen is striated at base.

Described from four specimens.

Prosacantha Nees.

(7) *Prosacantha brachyptera*, n. sp.

♀. Length .03 inch. Black, shining. Thorax sub-opaque, microscopically punctate; metathorax with an acute spine on its disk. Antennæ brown-black. Legs red. Abdomen broadly oval, black, excepting the first segment, which is red and striated. Wings short, narrow, somewhat spatulate, not ciliated; the marginal vein long, black, the stigmal short, post-marginal vein wanting.

Described from three specimens.

This species comes nearest to *P. minutissima* Ashm., from which it is,

however, readily distinguished by the narrow, non-ciliated wings, and the color of the first abdominal segment.

Pentacantha, n. g.

This genus is closely related to *Prosacantha* Nees and *Trisacantha* Ashm.; but is at once separated from them by having five spines on the metathorax, three short ones on the disk and one long one on each side; and besides, there is a short, smooth, blunt horn at the base of first segment, partly prolonged over the metathorax. Its other characters are exactly as in *Prosacantha*. The blunt horn issuing from the base of first segment would seem to indicate a relationship with *Inostemma* Haliday, but that genus is in another sub-family.

(8) *Pentacantha Canadensis*, n. sp.

Female. Length .08 inch. Polished black; thorax opaque. Head smooth, except some lines back of eyes and on occiput. Antennæ 12-jointed, brown; first funiclar joint twice as long as the pedicel; second two thirds the length of first; third about as long as wide; fourth shorter than wide; club large, six-jointed. Thorax and scutellum rather coarsely rugose; no parapsidal grooves. Legs, including anterior coxæ, honey-yellow, middle of femora and tibiæ obfuscated. Abdomen polished black, the third segment longest and widest; first and second segments, and the third excepting on its disk, longitudinally striated. Wings dusky-hyaline, venation as in *Prosacantha*, veins rufo-piceous.

Described from one specimen.

Sub-family PLATYGASTERINÆ.

Metaclisis Forster.

(9) *Metaclisis erythropus*, n. sp.

Female. Length .08 inch. Black. Head opaque, coarsely rugose on vertex and back of eyes. Antennæ 10-jointed, the terminal joints of funicle enlarged into an irregularly rounded club; club six-jointed, filiform Thorax shining, finely reticulated or scaly; parapsidal grooves distinct, converging and meeting at the base of the scutellum. Legs red. Abdomen polished black. Wings dusky hyaline.

Described from one specimen.

Ectadius Forster.

(10) *Ectadius Canadensis*, n. sp.

Female. Length .12 inch. Polished black. The head is delicately

transversely striated on vertex back of the ocelli and on the lower portion of the face. Antennæ reddish brown. Legs red, tarsi paler, yellowish. The thorax has two distinct parapsidal grooves and is delicately microscopically punctate. Metathorax, metapleuræ and base of abdomen densely pubescent. Abdomen polished black and prolonged into a long point posteriorly, being more than twice the length of the head and thorax combined. Wings hyaline.

Described from one specimen.

Sactogaster Forster.

(11) *Sactogaster Howardii*, n. sp.

Female. Length .07 inch. Polished black, impunctured. Antennæ and legs dark red, the posterior femora obfuscated, tarsi paler. The scutellum is convexly high, striated and ends in a spine. The tail is nearly twice the length of the inflated venter. Metathorax and metapleuræ wrinkled. Wings hyaline. Hab.—Washington, D. C.

This species is described from one specimen taken by myself last summer, on the outskirts of Washington. It is dedicated to my friend, Mr. L. O. Howard, of the U. S. Dept. of Agriculture. Its much larger size, striated scutellum and longer tail will at once distinguish it from *S. anomaliventris*, described from Florida. In that species the scutellum is smooth, while the tail is not as long as the inflated venter.

Sub-family DIAPRIINÆ.

Aneurhynchus Westwood.

(12) *Aneurhynchus mellipes*, n. sp.

Female. Length .10 inch. Black, shining, sparsely pubescent. Antennæ 12-jointed, red, stout, clavate; the scape is greatly thickened, a little shorter than half the length of the flagellum; pedicel thicker, but not half as long as the first funiclar joint; second shorter than the first, and the third shorter than the second; from thence the joints are shorter than wide and well separated. Parapsidal grooves distinct. Legs, including the coxæ, honey-yellow. Abdomen polished black, petiole rugose. Wings sub-hyaline, pubescent; the submarginal vein ends in a callosity and a short stigmal vein, but it does not reach the costal margin; the sub-marginal vein is very pale.

Described from one specimen.

Paramesius Westwood.

(13) *Paramesius clavipes*, n. sp.

Female. Length .08 inch. Polished black, covered with some long, sparse hairs on head, thorax and surrounding apex of abdomen; the metathorax, metapleuræ and abdominal petiole densely pubescent. Antennæ 13-jointed, red, gradually incrassated toward tips; first funiclar joint very slightly shorter than pedicel, following joints to fifth, sub-equal, from thence moniliform, slightly pedicellated, the terminal joint more than twice the length of the preceding joint, fusiform. Thorax without grooves, somewhat flat, sides compressed; collar red at sides. The abdomen is pointed ovate, a deep depression above near base, while the ovipositor is exserted between two short valves, probably unnaturally so. Legs red, the femora strongly clavate, the tarsi very long, the anterior and middle pairs being longer than their tibiæ. Wings sub-hyaline, the marginal vein but slightly developed, not longer than the very short stigmal vein.

Described from one specimen.

Loxotropa Forster.

(14) *Loxotropa pezomachoides*, n. sp.

Female. Length .04 to .05 inch. A small, highly polished, black, apterous species, sparsely covered with some long hairs. The antennæ and legs dark red. Antennæ 12-jointed, moniliform, the four terminal joints being much widened and slightly pedicellated, the last joint of which is large, fusiform.

Described from six specimens.

(15) *Loxotropa Harringtoni*, n. sp.

Female. Length .04 inch. Black, polished, covered with some long, sparse hairs. The collar at sides, metathorax and abdominal petiole well covered with dense, white pubescence. Antennæ 12-jointed, dark red, the four terminal joints abruptly larger than the preceding, and the species may be readily known by this character, and by the last funiclar joint being a little longer and more slender than the preceding one. The legs, including all coxæ, red. Abdomen clavate, the ovipositor slightly exserted. Wings dusky-hyaline, heavily pubescent and ciliate; the marginal vein hardly developed, thickened.

Described from one specimen.

(16) *Loxotropa armata*, n. sp.

Female. Length .07 inch. This species is very closely related to

L. Harringtoni, agreeing with it in color, wing characters, etc., but it is much larger, the antennæ much more incrassated toward apex, the terminal joint being very large and thick, and as long as the three preceding joints combined; these four terminal joints, which constitute the club, are as usual slightly pedicellate. Another character which will readily distinguish it from all other species is a short conical spine in the centre of the metathorax.

Described from one specimen.

(17) *Loxotropa abrupta* Thompson.

This European species must now be added to our fauna, Mr. Harrington having taken a specimen in Canada which I am unable to separate from types from Europe in my collection.

Monelata Forster.

(18) *Monelata hirticollis*, n. sp.

Stature and size of *M. mellicollis* Ashm., but differs in being entirely black; the collar, metathorax and petiole densely pubescent; antennæ dark red, the very large terminal joint nearly black, while the legs are reddish-yellow. Wings hyaline, ciliate.

Described from one specimen.

Sub-family BELYTINÆ.

Zygota Forster.

(19) *Zygota Americana*, n. sp.

Female. Length .14 inch. Polished black, covered with a fulvous pubescence. Antennæ 15-jointed, filiform-moniliform; first funiclar joint twice longer than the pedicel, other joints almost round, sub-pedicellate. Parapsidal grooves of mesonotum broad, distinct. Scutellum with a deep depression at base. Metathorax carinated. Legs, including all coxæ, honey-yellow; first tarsal joint of anterior legs long, deeply emarginate at base. Abdomen ovate, black, a lateral streak on the apex of sixth segment red; venter densely pubescent; petiole twice as long as wide, fluted. Wings fusco-hyaline, pubescent; veins brown, the marginal cell not quite closed.

Male. Length .12 inch. This may be distinguished from the female principally by the antennæ. They are 14-jointed, long, filiform, pubescent, pedicel rounded, the first funiclar joint about five times as long as thick, excised at base, the following joints about four times as long as

thick. There is a tooth beneath anterior femora, near the base; while the anterior tibiæ are peculiarly twisted, the twisted part ending in a spine, besides the apical tibial spine. Otherwise as in the female.

Described from one male and one female specimen.

AN INTERESTING NEW CHALCID FROM CANADA.

BY WM. H. ASHMEAD, JACKSONVILLE, FLA.

Among a small collection of parasitic Hymenoptera sent me by Mr. James Fletcher, the Dominion Entomologist, for names, I found an interesting Chalcid belonging to that remarkable Pteromalid genus *Caratomus* Dalman, no species of which has as yet been described as occurring in our fauna; and as the present species seems to be distinct from the European species, *Caratomus megacephalus* Dalm., I believe it to be undescribed, and submit herewith the following description:

Caratomus leucophthalmus, n. sp.

Male. Length .10 inch. Robust, blue-black, confluently, granulately punctate. The head is very large, its breadth being nearly twice the width of the thorax when measured from eye to eye; its front is deeply, broadly emarginated, and there is a deep emargination or broad groove extending from the eye obliquely towards the mouth, the upper edge of which forms an acute tubercle, while the lower edge forms an acute ridge The eyes are satiny white, finely pubescent. The antennæ are 13-jointed, clavate; scape, the long pedicel, and first and second funiclar joints brownish-yellow, the following joints brown. The legs are red, excepting the trochanters, extreme tips of femora and tibiæ and the anterior tibiæ, which are wholly brownish-yellow. The abdomen is oval, with a dull bronzy tinge; petiole short, yellow. The wings are hyaline with a large fuscous blotch across the middle; veins thick, rufo-piceous; the submarginal vein is distant from costal edge and nearly three times as long as the marginal vein; the stigmal vein is about as long as the marginal, curved; while the post-marginal is distinctly longer than the stigmal vein.

Described from one male specimen taken on a window at Ottawa, in 1885, by Mr. James Fletcher.

MOTHS NEW TO OUR FAUNA.

BY JOHN B. SMITH, WASHINGTON, D. C.

Mr. Hy. Edwards, on p. 12 of vol. xx. of the CAN. ENT., records three species of moths as additions to our fauna—two of them *Sphingidæ*, viz., *Pseudosphinx tetrio* and *Philampelus typhon*. Mr. Edwards is undoubtedly correct in the record of localities, and in calling attention to their capture within our faunal limits; but, with all due respect, I do not think that these species should be added to our faunal list. *Erebus odora* has been found in Canada, yet it would be an absurdity to cite it as a Canadian insect. The mere fact that an insect well known and abundant in one faunal region is occasionally found in another, does not authorize its addition to the latter fauna unless it breeds in or regularly migrates to it. *Sphinx tetrio* is a very common species which we have from Mexico, South America and the islands of the Carribean Sea. It is essentially a tropical and sub-tropical insect, and does not come into the temperate fauna except accidentally. It is undoubtedly true that political boundaries cannot limit faunal regions, and yet the southern boundary of the United States very nearly accords with the faunal line separating the temperate from the sub-tropical fauna. Species occurring near this faunal border, especially species of strong flight like the *Sphingidæ*, will often cross the line; but this does not make them members of both sides. The rule should be that only insects which breed within the faunal limits should be considered as forming parts of it. Ordinarily the presumption is that an insect breeds where found. This presumption fails where the insect is known to breed in a different fauna, and then positive proof should be required of its right. On this view I must dissent from Mr. Edwards's idea that these particular species should be added to our fauna. In a monograph of the *Sphingidæ* now ready for the press, I have excluded these species, and in addition *Diludia brontes* and *D. leucophæata*—both species possibly occasional visitants to our fauna, but really members of the next, or sub-tropical.

Southern Florida has a peculiar fauna, and one that perhaps should not be classed within the temperate limit. It really in many respects should be classed with the West Indian fauna, but on this point I make only the suggestion. It seems to me that Mr. W. H. Edwards, in the Rhopalocera, has followed the wiser plan of separately calling attention to species occasionally found in but not really belonging to our fauna.

DESCRIPTION OF THE PREPARATORY STAGES OF DATANA DREXELII, Hy. Edw.

BY WM. BEUTENMULLER, NEW YORK.

Egg.—Similar to *D. ministra;* cannot be distinguished from it. Laid in masses on the under side of leaf.

Young Larva, after First and Second Moults.—Cannot be distinguished from *D. ministra.*

After Third Moult.—Little change except in size. The stripes are now confluent about the anal segments. Length 30 m.m.

After Fourth Moult.—Head jet black, cervical shield now chestnut brown instead of black; otherwise as in *D. ministra.* Length 40 m.m.

Mature Larva.—Head jet black, shining, slightly punctured; cervical shield and neck wholly golden yellow. Body black, with four equidistant stripes of citron yellow on each side, and three on the under side. Abdominal legs and bases of thoracic feet orange. The stripes all become conjoined at the posterior extremity. The anal plates jet black, *very shiny and nearly smooth, and not roughly punctured,* as in *D. ministra.* The hairs over the body are sordid white. Length 55 m.m.

Pupa.—Cannot be distinguished from *D. ministra.*

Food Plants.—Huckleberry *(Vaccinium),* and Witch Hazel *(Hamamelis).* Single brooded.

STRAY NOTES ON MYRMELEONIDÆ, Part 4.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

(Continued from vol. xix., page 38.)

4. *Brachynemurus abdominalis.*

Myrm. abdominalis Say, Godm. West. Quart. Rep. ii., 163—Edit. LeConte, I., 173.

M. juvencus Hag., Syn. N. Am. Neur., 234, 21 (var. with longer spurs).

Yellowish, slender, faintly villous; face yellow; between the antennæ and a little above, a longitudinal median line, connected with a transversal one on the epistom, all black; palpi equal, pale, the apical joint of maxillary and this of labial, which is very little thickened in the basal half, somewhat brownish; antennæ longer than head and prothorax, in the male

fuscous annulated with luteous, especially before the tip, which is clavate; shorter, more clavate in female; the two basal joints brown, shining; vertex elevated, rounded, yellowish with two blackish dots; prothorax little longer than broad, yellowish, with two dorsal black lines, ending on the anterior transversal sulcus; sometimes a darker spot in front of the lines; on each side and nearly below a black band connected with the lateral one of the thorax; two black maculose bands including yellow spots on the thorax; mesothorax before wings black, with yellow spots; abdomen of male much longer than wings, faintly villous yellow, with a fine black median line, apical part blackish, yellow on articulation and some lateral marks; appendages less than half the length of last segment, cylindrical, yellowish, brown at base, densely clothed with black hairs; below and between them a small triangular yellow plate; abdomen of female as long as wings; coloration similar, but the dorsal yellow band divided by a black line reaches the apex; genital parts yellow, the superior part split, with many black spines; below two short yellow appendages. Wings hyaline with a faint yellowish tint; veins pale interrupted with brown, which covers in front wings most of base of the small forks and the base and apex of the transversals; therefore the wing is faintly sprinkled, more densely along the mediana and submediana; hind wing similar but less and more faintly sprinkled; pterostigma white, larger in the female; wing around and on the venation faintly villous; apical half of costal space with forked veins. Legs short, pale, sprinkled with black, with black hairs; tip of tibiæ and of joints of tarsi black, fourth joint entirely black; spurs as long as three basal joints, or at least longer than two, brown. Length of body, male, 30 to 37 m.m.; female, 28 to 30 m.m. Exp. al., 36 to 54 m.m.

Habit., New Jersey, Uhler; Pennsylvania; Georgia, Morrison; Washington, O. Sacken; Rock Island, Ill., Walsh; Utah, Lake City, O. Sacken, August 1, and Packard, August 13; Colorado, Golden City, Boulder, July 3, Packard; Texas, Dallas, Boll; Waco, Belfrage, June, July, Sept., Oct.; San Antonio, A. Agassiz; Carrizo Spring; New Mexico, Zuni, Hayden's Exped., July; Umatilla, Washington Territory, S. Henshaw, June 28; California, Vulcane Mts., Stinking River, H. Edwards.

The size of the specimens is rather variable in the same locality; there are before me now more than 50 of both sexes, but I have seen more. The species seems very common in Texas, Colorado and New Mexico.

There is not much variation. Texas specimens have on the front part of the prothorax two brownish spots, and younger specimens are more bright in colors ; a number of specimens have the spurs longer, equal to the three basal joints, though others of the same locality have spurs two joints long, *M. juvencus* Hag. is *Myrm. abdominalis* Say.

5. *Brachynemurus peregrinus.*
Myrmeleon peregrinus Hag., Syn. N. Am. Neur., 234, 20.

Face yellow, with a short black band above, surrounding the antennæ below ; sending a faint black median line on the upper part of the face, not reaching the clypeus ; mouth yellow ; palpi yellow, the maxillary with the last joint cylindrical fuscous ; labials a little longer, last joint shining black, extreme base and tip yellowish, seen from above strongly fusiform with a kind of ocellus-like transparent median spot ; seen from beside the joint is less bulky, the third apical part strongly narrowed, conical. Antennæ longer than head and thorax, strong, clavate, black, scabrous, dull, the two basal joints below shining brown ; the base and apex of the antennæ sometimes pale brown, and very faintly annulated ; vertex elevated, rounded, yellow ; black in front with three not well defined yellow dots and two black transversal bands, the last one interrupted in the middle, and arcuated ; prothorax scarcely longer than broad, yellow on the dorsum, with four longitudinal black lines, and beneath on each side with a black stripe ; the pattern of the dorsum and its many variations is better to be understood in describing it as black, divided by a narrow yellow line and each part divided again by a yellow line not reaching the front ; broken in the middle and forming two elongate spots, of which the inferior ones may disappear ; mesothorax black with yellow dots near the prothorax ; after this yellow with three black forks ; metathorax yellow with a black cross ; sides of thorax black with some yellow bent stripes. Abdomen faintly villous ; above yellow with three longitudinal black bands, the median much finer on the male, which has the three last segments black ; venter fuscous ; abdomen of male much longer than wings ; appendages light brown with very long black hairs and bristles, very short, blunt pyramidal, divergent ; between them and below a small plate of the shape of a leaf, which can be folded in the aperture between the appendages ; abdomen of female as long as the wings, dilated and compressed to the apex ; genitals light brown, the superiors split, below with a transversal row of very strong black spines ; below two short cylindri-

cal appendages, brown with black hairs; they are retractible into the abdomen, and so often not visible. Legs yellow, sprinkled with black, and with black hairs; hind femurs sometimes fuscous in middle; tip of tibiæ and of the joints of tarsi blackish; spurs brown, as long as the two basal joints. Wings long, broad, hyaline; pterostigma yellowish; veins fuscous interrupted by pale yellowish; transversals along the median and submedian pointed with fuscous; the points above the submediana are larger and more numerous, forming nearly a serrated black line; also the gradate veins going from the end of the submediana upwards and outwards to the tip of wing form often a brown line, more or less visible; the smaller forks along the hind margin dark; costal space of front wings only with a few forked transversals before the pterostigma; hind wings a little shorter, narrower, nearly hyaline.

Length of body, male, 42 to 51 m.m.; female, 30 to 36 m.m. Exp. al., 60 to 75 m.m.

Hab., Washington Terr., Ainsworth, July 20, very common; opposite Umatilla, June 27; Oregon, Umatilla, June 24–25; all these coll. by S. Henshaw, 1882. California, Fort Tejon, by Xanthus de Vesey; San Francisco, 1865. Nevada, Humboldt Station, July 29; O. Sacken. Colorado, Pueblo. New Mexico (formerly W. Texas), Pecos River, July 7; and Matamoras, Mexico, Exped. of Capt. Pope.

There are 40 specimens before me of both sexes. In the small town Ainsworth, in the middle of a sandy desert, the windows of the office in the little inn where we had to stay the night, were literally covered with specimens. This species belongs to the west of the Rocky Mts. The specimens from Mexico—Matamoras—are smaller than the others, but not different.

THE BUTTERFLIES OF NORTH AMERICA, by W. H. Edwards. Part iv. of the Third Series has recently been issued. It contains the usual three magnificent plates; the first represents both sexes and several varieties of *Colias Chrysomelas*, the second the upper and under surfaces of both sexes of the lovely *Argynnis Nausicaa*, and the third fully illustrates all the stages of *Cœnonympha Galactinus*, form *California*. The letterpress contains much interesting matter on the life histories, in addition to the descriptions of the species.

The Canadian Entomologist.

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NATURAL HISTORY NOTES ON COLEOPTERA.—No. 4.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Bembidium undulatum, Sturm. There are now about thirty-eight species of Carabidæ recognized as indigenous to North America and Europe, and some of them also to Asia. The most of these are arctic or very northern, this being one of the few that occur in temperate America, but how far northward it inhabits is unknown, as I know only of its occurrence here, though in Europe and Asia it is found in sub-arctic regions. Here it is taken abundantly in July and August under decaying vegetation in moist alluvial places subject to occasional inundation. It is a Notaphus, .20 inch long, shining, elytra obscurely rufo-piceous, paler at apex with oblique pale mark, punctures of striæ obsolete behind middle and surface undulated. Identical with European specimens, and also verified by Dr. Horn.

Bembidium assimile Gyll. *(frontale* Lec.) is found here with the preceding, but much more abundantly ; I have it from Florida, and it seems to occur generally eastward from the Mississippi, and also in Kansas. In Europe and Asia it has the same distribution as *undulatum*. On comparison with European specimens no point of difference has been discovered.

Platynus pusillus Lec. Having recently examined and compared a number of *Anchomenus oblongus* Fab. from Sweden with the same number of the foregoing from Massachusetts, I conclude that Dr. Horn would have been entirely justifiable in pronouncing the species identical (Tr. Am. Ent. Soc., ix., 142), where he writes, "the only striking difference between the two being in the slightly wider thorax of our species." This difference, when a number of each is examined, is observed to be merely individual, and were I to write of the thorax, on the basis of a numerical estimate of what is before me, the statement in the above quotation would be reversed. The species has a wide distribution on this continent—Vermont, Massachusetts, New York, Canada to Kansas. In the Eastern

Hemisphere it extends across Europe, and in Asia, throughout Western Siberia.

Harpalus caliginosus Fab. The stridulation of this common beetle is referred to in Ent. Amer., ii., 239, as not recorded previously and as a discovery of Dr. Horn, and also that stridulation takes place only when the beetle is at liberty, and can not be made to do so when handled. This species and *H. pennsylvanicus* DeG. feed on ragweed *(Ambrosia artemisiæfolia)* when it is in bloom—here, in July, and both are excessively abundant. Let the entomologist visit on a calm, sultry evening, before sunset, some stubble field bordered by woods, when this weed is in flower, and he will often witness a lively and by no means quiet scene; hundreds of the former and thousands of the latter will be seen mounted on the weeds, each actively and intently employed in collecting the pollen from the flowers, or licking some delectable morsel from the leaves and occasionally evidencing its delight in a sonorous manner—a sudden squeak—somewhat like the noise made by a steel pen scratching rough paper; and so intent are they on the business in hand as to be captured before observing the approach of an enemy.

Striduiation is effected in both by the beetles rubbing the large costæ of the wings against the elytra, these costæ being coarsely transversely rugose from the base to near the apex. Stridulation is readily produced after death by pressing intermittently on the elytra, provided the costæ are in a position to be brought in proper contact with them.

H. compar and *H. longicollis* are catalogued as varieties of *H. pennsylvanicus*, but curiously enough, though abundant, they do not seem to have the same tastes, as I have never taken a single specimen of either on ragweed, though carefully sought for. I strongly suspect they are really three distinct species, notwithstanding the near approach in form of some individuals, and certainly nothing is gained by the collector by classifying them as varieties.

Graphoderes fasciatocollis Harr. was considered to be the same as the European *G. cinereus*, till separated by Dr. Sharp in his learned Monograph of the Dytiscidæ, p. 693; this separation is pronounced "unwarranted" by Dr. Horn, Tr. Am. Ent. Soc., x., 280. Two primary points of difference are given by Dr. Sharp; the first, that the male of *fasciatocollis* has "twenty-three" small pallettes on the anterior tarsus and twelve on the middle, while that of *cinereus* has "about twenty-eight" on the anterior and fourteen on the middle one; the second, that in the former

the punctuation of the elytra is dissimilar in the sexes, being in the female fine and deep at the sides and somewhat dense at the base, while those of the latter are alike in both sexes. Recently I examined several specimens of *cinereus* from Prussia and compared them with American forms, with the result of confirming Dr. Horn's opinion. Four males have each from thirty to thirty-three small pallettes on the anterior tarsus, and four have twenty-eight—all with fourteen on the middle; one has twenty-five on the anterior and twelve on the middle, with two rudimentary; one has twenty-three on the anterior and twelve on the middle, with doubtful traces of two others. As the pallettes decrease in number they increase in size and distinctness, but do not equal those in my single American male. The sculpture of the elytra in the sexes (seven females seen) might be termed uniform, though the punctuation is more pronounced in two or three females; the anterior black band of the thorax does not "always attain the front margin," but exhibits the same variableness as exists among American individuals. With the above I have compared one male and three females of *fasciatocollis* from Massachusetts and one female taken here; the male has twenty-three small pallettes on the anterior and twelve on the middle tarsus, all larger than in the European forms. Whether this number is constant, or variable as in the foreigners, would be desirable to know, that is, in a number taken together, for Dr. Horn has demonstrated the variableness when from distant localities. The three Massachusetts' females have the elytra sculptured like the male and could not be distinguished in this respect from their European sisters; but the female taken here is much coarser sculptured and punctured than ever Dr. Sharp's description requires. Both the points insisted on by the learned Doctor for separate species are shown by the above to be untenable.

Philhydrus fimbriatus Mels., one of the most common of the Hydrophilidæ, inhabits in great abundance all wet places, especially where there is mud—swamps, ponds, springy places, springs on hill and mountain sides, etc. It is variable in sculpture, size and color. The intention here is to bring to notice a dwarf race that inhabits the little rivulets that flow down hill and mountain sides from springs. While the normal form is piceous black with pale thoracic and elytral margins, and about .20 inch in length, this might be termed gray with paler margins, and in length is not over .15 inch. In summer these spring runs are often dry for long periods, and the beetles then crawl under stones and rubbish where there

is a little moisture; these long droughts and the comparative scarcity of food undoubtedly have dwarfed them, and living in clear water clinging to stones has called into exercise a potential element that seems to inhere in many insects of accommodating their colours to their surroundings. The black colour of the mud-inhabiting race would make them too conspicuous, so they have changed it to sober gray to correspond with the general colour of the stones and bottom of the brook.

Oxyporus 5-maculatus Lec. Seven other species of this genus occur here more or less abundantly from the middle of August onward, all living on various species of living mushrooms; but *5-maculatus* appears to be rare, as I have only taken it three times—two at a time, and like the others, feeding on mushrooms, but in June, and on rocky, mountainous places. It differs remarkably from the other species by having the sides of the thorax posteriorly so compressed as to elevate the disk at the middle of each side at base into a flattened tubercle in such a way as to make the expression, "thorax posteriorly concave," not inappropriate.

Dendrocharis flavicornis Guer. A specimen of this curious insect, now in the cabinet of Dr. Horn, was recently taken near St. Augustine, Florida, by Mr. Charles W. Johnson, who dug it out of a tree. This is the only native specimen in any of our collections so far as known. See figure and description, Tr. Am. Ent. Soc., xiii., 12.

Meristhus. If the definition of this genus in the Classification, "Front tarsal grooves wanting," is correct, the two species under it in the Catalogue should be placed under *Lacon*, as they have these grooves deep. I suspect a misprint of "tarsal" for tibial, but a careful examination shows the existence of these grooves quite evidently in some specimens of *cristatus*, though obsoletely so in others. There seems to be little need of the genus anyhow.

Dicerca prolongata Lec. and *D. divaricata* Say. A single character that will in all cases separate these species infallibly is something not yet in print. The prolongation and degree of divarication of the elytra are the same in both; a typical specimen of the former kindly sent me by Mr. Ulke, collected in Dakota, has the tips of the elytrons as widely separated as in *divaricata*, while on the other hand I have a specimen of the latter with the tips very prolonged and contiguous to near the end (*D. dubia* Mels.) The depth and distinctness of the thoracic channel is not a character to be depended on; my type of *prolongata* has a very deep and uninterrupted channel, but I have a specimen of the other taken

here approaching it closely, and from this are all degrees of variation to the slightest noticeable depression. No character can be derived from the spurs of the middle tibiæ of the males, for when a large number of *divaricata* are examined, this will be seen to vary from a mere tubercle to a formidable spur with long teeth on the distal edge. Colour, as a character, is not worthy of consideration. I have a specimen of *prolongata* from Canada with the upper side polished black with a purple reflection and the under coppery black. A point given me by Mr. Ulke (a character given by Dr. LeConte) is more permanent than any of those mentioned above, viz., tips of the elytrons with the angles rounded—*prolongata;* tips of the elytrons with the sutural angles terminating in a small spine—*divaricata.* This is the most constant character noticed, but by itself fails in individual cases under observation. I do not question the distinctness of the species. *Prolongata* breeds, so far as known, in conifers, and inhabits high altitudes and latitudes, while *divaricata* is more southern, being abundant in parts of Canada and all the States east of the Mississippi, breeding in diseased or dead deciduous trees, as beech, maple, apple, cherry, etc.

Dicerca obscura Fab. For a set of typical specimens of the real *obscura* as defined by Dr. LeConte, I am indebted to Mr. Ulke, who takes it quite commonly at Washington, D. C., on persimmon *(Diospyros Virginiana).* There is a tendency among collectors to confuse this with Dr. Leconte's *lurida* Fab., as defined in his Monograph, and to give the latter either name according to fancy. My observations, however, are that there are sufficient differences to keep them apart, at least as races, and to the collector this is the same as if they are separate species. In an examination of about one hundred and twenty specimens of *lurida* taken here or received from other places, I find that the thorax is in every case wider near the middle than at base, and that behind the middle the sides converge more or less to the base in a line varying from nearly straight to deeply sinuous. In *lurida* the reverse occurs, the widest part of the thorax is the base, and the convergence, though not great, is directed anteriorly, and from the middle to apex is more pronounced. The directions of Dr. LeConte in his Monograph, if strictly followed, are quite sufficient to effect a separation. *Lurida* breeds in dead and diseased hickory, and is very abundant, but I have never seen a specimen of *obscura* taken here.

Dicerca spreta Gory appears to be rare and I have it not, though

asperata Lap. & Gor. has been sent me for it by good collectors. Errors are mostly difficult to eradicate, and this one is not likely to be got rid of soon, at least not till the genus is monographed anew. The trouble is about this way. Dr. LeConte in his Monograph (Tr. Am. Phil. Soc., xi., 198) fully and clearly described a *spreta* and an *asperata*, which, of course, went so into all collections; but fourteen years afterwards Mr. G. R. Crotch (Proc. Acad. Nat. Sci., 1873, p. 85) states that the names given by Dr. LeConte should be reversed, but in his Catalogue misplaces the species, though giving the synonyms. In Mr. Henshaw's Catalogue the same order is followed, but the synonyms dropped, and now nothing points to an error in Dr. LeConte's Monograph. The error was corrected in few of the older collections, and is transmitted from them by tradition, while the latest catalogue indicates no error to one not conversant with the whole literature of the subject.

Aphodius rufipes Lin. is mentioned at page 9. Mr. Blanchard, of Mass., writes that he has a specimen collected in the mountains of North Carolina. These mountains are the Alleghany, the same as at St. Vincent's and at Deer Park. Thus, this recent discovery is already traced in a direct line over this continuously rugged country more than 400 miles.

Stenosphenus notatus Oliv. breeds in the limbs of dead hickory; it becomes a pupa the latter part of the second year and the imago is perfected before winter, but remains in the wood till the April or May following. *Neoclytus capraea* Say, which breeds in ash and often renders worthless logs cut before June, follows the same course. A manufacturer who uses this timber showed me a log in his shop in December that must have contained hundreds. When split in any direction the beetles crawled out of the opened burrows and appeared quite active.

Saperda concolor, mentioned page 8, Mr. Blanchard informs me, breeds in a low willow and in *Populus tremuloides*—in Massachusetts, the "Common Poplar," but here and everywhere west of the Alleghanies, the "Quaking Asp." How many other trees are "Common Poplar?"

Chrysomela præcelsis Rogers, when found, is in abundance, but its habitat is limited. It feeds on the leaves of Convolvuleæ (*Ipomœa pandurata* and *Calystegia sepium*) growing on the banks of rivers and moist alluvial ground, but not on the same plants when away from water. Its season of abundance is about the middle of June.

Apion herculaneum Smith occurs plentifully about the last of May on

the cymes of the maple-leaved arrow-wood *(Viburnum acerifolia)* just as they are going out of bloom. The fruit of this does not ripen till October, and some larva lives in the fleshy substance in which the thin, flat coriaceous seed is immersed, which is probably that of this *Apion*, though not yet so proven. This is one of the largest species of the genus, and when beaten into the umbrella behaves and looks so much like the worthless *Anthonomus quadrigibbus*, that till the past season it was always rejected.

DESCRIPTION OF THE PREPARATORY STAGES OF ARGYNNIS HESPERIS, Edw.

BY W. H. EDWARDS, COALBURGH, W. VA.

Egg.—Conoidal, round-topped, nearly as broad at base as high, the top depressed; marked by about 19 thin, elevated, vertical ribs, one half running from base to summit, the others but four fifths or more the distance; the spaces between crossed by many low horizontal ridges; the micropyle surrounded by two or three circles of very fine depressions, outside of which are rows of very large four or five-sided depressed cells; color yellow-green. Duration of this stage about ten days.

Young Larva.—Length .06 inch; cylindrical, thickest in middle; color yellow-green; marked as in the allied species by rows of flattened tuberculous brown spots, each of which gives one or two long, tapering hairs; on dorsum of 2 a dark oval patch with a row of hairs in front, turned forward, and a shorter row behind; head obovoid, black, with many long hairs. The larva hibernates directly from the egg.

After First Moult: Length .1 inch; color green, mottled with brown over dorsum; the under side pale green; the spines in number and position as at maturity, and as in the genus, small at base, tapering little, wholly black, beset with many short black bristles; head obovoid, black, with black hairs. Duration of this stage eight days, in April and May.

After Second Moult: Length .15 inch; color brown and gray; a double indistinct gray dorsal stripe, and a similar one between dorsal and upper lateral spines; the spines black; those of the middle row have the bases on outer side pale yellow, of the lower row the bases are wholly pale yellow; head as before. Duration of this stage eight days, in May.

After Third Moult: Length .28 inch; color black and dark gray, the sides mottled; the double dorsal stripe more definite than before; the spines as before; head same also. To next moult four days, in May.

After Fourth Moult: Length .44 inch; color black and gray; the dorsal stripe now solid, dark gray; the spines black to bases except those of lower row, and on 3 and 4 of middle row, all which have yolk-yellow at base and half way up the stems; all bristles black; head brown-black over the front with many black hairs, long and short, the back brownish-yellow. To next moult eight days, in May.

After Fifth Moult: Length .7 inch; in about eight days was fully grown.

MATURE LARVA.—Length 1.2 to 1.4 inch; slender, somewhat thickened in middle, the segments well rounded; color wholly velvet-black or brown-black (no gray dorsal stripe as before last moult); three rows of spines on either side, as in the genus, all of them yellow nearly to tip, the rest black; feet black, pro-legs brown-yellow; head sub-cordate, the vertices rounded, dull brown in front, dull yellow at back. From fifth moult to pupation 14 days.

CHRYSALIS.—Length .9 inch; breadth across mesonotum .26, across abdomen .23 inch; like *Atlantis* in shape, but stouter; color dark brown over head and wing cases; so also on the front of each abdominal segment, in serrations, the rest yellow-brown. Duration of this stage ten days, in June.

HESPERIS flies in Colorado, Utah and Montana. Mr. Bruce writes me of its habits thus: "*Hesperis* is by far the most abundant species of the genus along the canons and water courses of the eastern or front range of the Rocky Mtns., in Colorado, at from 6,500 to 8,000 feet elevation. It is very active and restless, and difficult of capture except when on flowers. They are very partial to the bloom of Clematis, and I have frequently taken several at one sweep of the net on this plant; later in the season, on the tall Sunflower. The wild Bergamot and Horse-mint are much frequented by them. They are also fond of alighting on the ground in damp places, especially, late in the summer, when they are worn. I have taken them in Clear Creek and Platte canons from June 16th till end of August. *Hesperis* is a very pugnacious insect, and will circle round and boldly flap the Lycaenas and Theclas off the blossoms. I was amused one day, on the South Platte, with watching a male *Hesperis*

endeavoring to drive a Zygaenid moth *(Anatolmis Grotei)* off the blossoms of a large species of Senecio. The moth, which is a sluggish creature at all times, would not fly, but slowly backed round the corymbose head of flowers, occasionally lifting its front legs in feeble protest. *Hesperis* followed it, flapping its wings and clawing at it like a cat, till the persecuted moth at last escaped by slipping over the petals, and hanging on the under side. It is probably owing to this restless and quarrelsome disposition that individuals are so soon worn and broken. They vary much in size and in the color of the spots on under side, some being of a deep buff, others a dead white, and others with a trace of frosted silver. I have taken *Hesperis* just below the timber line, but it is not common at such elevations, nor below 6,500 feet in Colorado."

Mr. Bruce sent me eggs of this species from Denver, Colorado, which I received 9th July, 1886, and a second lot three days later. The eggs hatched at ten days, and after eating the shells, the larvæ went into lethargy. I sent them soon after to Clifton Springs, N. Y., to go in a cold room there, and they were returned 21st March, 1887, nearly all alive. But they came unexpectedly, and a month too soon, and before I could force a plant of violet for them nearly all had died. Of the few survivors, one passed 1st moult 20th April, the second 3rd May, the third 11th May, the fourth 15th, the fifth 23rd. This larva pupated 6th June, and the imago came out 16th June. Another pupated 11th June, but died before imago. The habits of the larvæ in confinement are similar to those of *Atlantis*. The butterfly is figured in Vol. 1, Butterflies of N. America.

SOME NEW NOCTUIDÆ.

BY G. H. FRENCH, CARBONDALE, ILL

Cucullia Hartmanni, n sp.

Expanse 1.75 inches, length of body .75 inch. General color of fore wings pale gray, so suffused in places with dark gray as to give the wings a moderately dark gray cast, but not so dark as *C. intermedia*, Spey. Lines black, basal half line only indicated on the costa. T. a. line double; the inner part almost imperceptible ; strongly dentate, from its origin projecting obliquely outward to a strong tooth on the fold in the discal cell,

with a short tooth on the fold between the costal and subcostal veins ; from discal tooth it recedes to median vein a little nearer the body than its inception on the costa ; from this it extends out in another tooth nearly twice as far out as the discal tooth, the point resting on the submedian fold, almost reaching the inflection of the t. p. line, the points of both lines nearly obsolete in a white patch at this place that fades out into the general color ; about the middle of the space from the median vein to submedian fold a brownish black spur is sent out parallel with the median vein, terminating above the middle of the white patch ; the line reaches the posterior margin by another inflexion on submedian vein, and another outward tooth below the vein. A fine line extends along the submedian fold to the white patch. Median shade distinct above the cell, outwardly oblique. Stigmata only indicated by a slight brown discoloration, except below the reniform is an arc on the median vein as though part of the annulus. T. p. line obsolete except on costa and below second median venule, the angle next to the white patch filled with a black shading ; from this a slightly double curved line extends to end of first submedian venule. Veins finely black ; in s. t. space a tendency to black interspaceal lines. Terminal line black, broken, a few inward inflexions. Fringe gray, brown tinted, a paler central line, cut with white at the end of veins to this line.

Hind wings sordid white, veins dark, a broad smoky black border that is narrow at the anal angle. Fringe pale with a dark sub-basal line.

Palpi porrect ; third joint slender, dark brown ; sides of first and second, brown mixed with white, white beneath. Eyes naked, without lashes. Head gray, a space between the antennæ with a black annulus. Collar gray with three narrow black lines, first space suffused with pale brown, tips of posterior scales white. Pategia clear pale gray, apparently a narrow terminal line. Thorax gray, one specimen shows indication of a very slight posterior tuft, but not more so than some *Agrotis*. Abdomen whitish, slight dorsal dark gray tufts on joints 1 to 3, usually a dorsal dark line, suffusion of pale brown on joints 4 to 7. Beneath whitish with a slight yellowish tinge ; legs gray, tarsi dark ; tibiæ unarmed.

Described from three specimens taken at Hockley, Harris Co., Texas, by my friend, Leopold Hartmann, to whom I have dedicated the species ; his number, 105, white label.

This is near *C. serraticornis*, Lintn., but differs in the antennæ being simple, and several points in coloration.

Hadena Evelina, n sp.

Expanse 1.50 to 1.70 inches, length .80 inch. General color of fore wings dark gray, washed with wine color over subterminal space, between and beyond the stigmata, and between median and submedian veins between t. a. and t. p. lines, the gray having a slight purplish reflection over the rest of wing. Markings black, of a brownish cast, perhaps more properly vandyke brown. Lines moderately distinct, double, the enclosed space a little pale; inner part only of basal half line distinct; t. a. line slightly oblique, straight in its general course; outward teeth on subcostal, median and submedian veins, the last two the most prominent; t. p. line only moderately outward curved beyond the cell, dentate; claviform extending one third across the median space, the t. a. and t. p. lines connected through this by an umber shade bar; s. t. line sometimes continuous, ochreous, dentate, the inner teeth interspaceal, these more prominent; five of them continued nearly across the s. t. space by umber dashes, these connected with black interspaceal dashes that extend across the terminal space to the outer margin. In others only the interspaceal light points are present, with mere traces in places of the line; stigmata concolorous, annulate with broken ochraceous, with mere traces of a black annulus; orbicular large, nearly circular, slightly oblique. A basal dash below half line. Fringe gray, a fine pale basal line, next to the terminal black lunulate line at the end of the wing.

Hind wings smoky white, a little more soiled terminally; a black terminal line; fringe concolorous, pale at the base.

Eyes naked; antennæ of male serrate, female simple; head, palpi and thorax concolorous with fore wings; a central black line on the collar, a black line also on pategia; dorsal tufts on thorax and abdomen prominent, concolorous. Abdomen darker than hind wings. Beneath, body pale purplish gray; tibiæ unarmed.

Described from three males and one female taken by Mr. C. F. McGlashan at Truckee, California; his number, 93. I have also a faded specimen from Shasta Co., Cal., taken by Mr. James Behrens.

In color and lack of strong outward inflection of the s. t. line, forming the usual M, this species belongs with *H. Arctica*, Bd., and its western ally, *H. Occidens*, Grote. The shade bar between the t. a. and t. p. lines relates it to *H. Bridghamii*, G.-R., placing it between *H. Arctica* and *H. Bridghamii*.

STRAY NOTES ON MYRMELEONIDÆ, PART 4.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

(Continued from vol. xx., page 60.)

6. *Brachynemurus nigrilabris* Hagen. N. sp.

Very similar to *B. peregrinus*. Face yellow, above with a large black band, which is rounded below and reaches nearly the clypeus; this band is going between and around the antennæ and connected above with the black part covering the whole anterior half of the vertex; posterior half yellow with a broad black longitudinal band, dilated angularly in middle; the angle sometimes protracted on each side in fine line, which does not reach the eyes; labrum shining black; palpi yellow, last joint of the maxillary cylindrical black; labials a little longer, last joint shining black, fusiform, sharply pointed, less inflated than in *B. peregrinus*. Antennæ longer than head and prothorax, fuscous, the apex nearly luteous; of the male, 8.5 m. m. long; of the female shorter, 7 m. m. long, visibly more clavate. Prothorax a little longer than broad, rounded, before yellow, with two approximate black bands, reaching the front margin, connected below with a shorter black external band, which reaches only the transversal furrow; a black line below the side margin; mesothorax black with two yellow dots in front, and two on each side near the wing; on the disc two yellow triangles in opposite position; hind middle portion yellow, with the anterior margin and two longitudinal bands black; metathorax similar, a black dot in the yellow triangles; sides of the thorax black with a few yellow stripes. Abdomen faintly villous, brownish, below fuscous, articulations pale; of male much longer than wings, three last segments blackish; appendages very short, pale brownish, hairy, cylindrical, blunt; between them and below a short pyramidal part; abdomen of female as long as wings, similar, articulations pale, last segment pale, on each side a dark spot; genitals pale, superior part split, with a row of strong black spines; below two short pale cylindrical appendages. Legs yellow, with black spines, femurs with a black band externally on the two hind pairs, with a black spot on tip of fore legs; tibia internally with a black line, those of fore legs variegated with brown; tip of tarsal joints faintly black; spurs brown, as long as the two basal joints. Wings hyaline, pterostigma white; venation brown interrupted with pale; subcosta and mediana

black interrupted with yellowish ; only a few costals before the pterostigma forked.

Length of body, male, 45 to 55 m.m. ; female, 33 m m. ; exp. al., 56 to 60 m.m.

Hab., New Mexico, Aug., 1872, Mr. Yarrow ; Colorado, Manitou ; Wyoming, Bridger Basin, Mr. Garman ; Salt Lake City, Sept , 1877, Mr. Austin ; Farmington, July 23; Ogden, Aug. 2, O. Sacken ; Dakota, Custer Co., Garman. Four males and three females in alcohol, and four females dry.

7. *Brachynemurus blandus.*

Myrmeleon blandus Hag., Syn. N. Am. Neur., 235, 22.

Small, yellow, marked with black. Face pale yellowish, with a superior trifid black spot ; it is united with the vertex by a narrowed part going upward between the antennæ ; on each side below the pale ring around the antennæ it reaches nearly the eyes ; the inferior margin bisinuated, sending a fine black median line to the clypeus ; labrum yellow ; palpi pale, maxillary with last joint cylindrical, brownish ; labials scarcely longer, last joint fusiform, very pointed, brown except on base. Antennæ clavate, strong, about as long as head and thorax, a little shorter in the female, where they are larger clavate, brown, luteous on clava, visibly annulated with yellow, principally on the basal half ; the two basal joints black. Vertex elevated, cut straight in front, black ; above yellow with two large approximate black spots, a little dilated externally. Prothorax as long as broad, yellow, with two black bands, which have anteriorly an external yellow incision ; the outer part of the black band reaches not the transversal furrow ; beneath on each side of the prothorax a black stripe ; mesothorax and metathorax black marked with yellow similar to *B. nigrilabris ;* sides below the wings black, with some yellow stripes. Abdomen clothed with white hairs, yellow above, trilineated with black ; beneath black ; of the male longer than the wings, slender ; appendages half the length of last segment, pale with long dark hairs ; cylindrical, obtuse on tip, which is bent up a little ; between them beneath a small short triangular plate ; of the female as long as the wings ; genitals pale, the upper part split with a transversal row of black spines ; below two short pale cylindrical appendages. Legs yellow, sprinkled with black, with black hairs ; tip of all joints of tarsi black ; spurs brown, as long as the two basal joints. Wings hyaline, hairy around and on the venation, which is black, interrupted by pale yellowish ; pterostigma large, pale yellow.

Length of body, male, 33 m.m.; female, 26 m.m.; exp. al., 40 m.m.

Habit.—The type, a female in bad condition from New Mexico (formerly Western Texas), Pecos River, May 14, from Capt. Pope's Expedition; a female from Idaho, Snake River, by Cyrus Thomas, 1872; a male from Bridger Basin, Wyoming, by Mr. Garman; Nevada, H. Edwards. I have never seen more than these four specimens, which are all alike.

The words of my description, Syn., p. 235, "vertex with two transverse black lines, the hind one interrupted," are to understand that the first line is formed by the front edge of the vertex, the second by the spots described.

ON THE DIAGNOSES OF N. AM. PHYCITIDÆ, BY E. L. RAGONOT.

BY A. R. GROTE, BREMEN, GERMANY.

I have received from the author a copy of this pamphlet in which a large number of North American species and genera are somewhat briefly described in anticipation of the publication of a general Monograph. That M. Ragonot is in a situation to materially increase our general knowledge of the group cannot be doubted. He has long collected types and specimens, and has studied the characters of the Old World genera. I have deprecated the description of *Phycidæ* without giving the full structural characters, and in so far as this has been done do I agree with M. Ragonot's introductory remarks. But I by no means consider that American authors should wait upon M. Ragonot to name their material, nor that what Dr. Staudinger chooses to do is binding upon them in the matter. I object to any hasty descriptions in this group, without denuding the wings and studying the head and mouth parts under the microscope. When this is done and a full description given, the term "haphazard" will no longer apply. For the element of certainty in a generic reference in these moths is only relative. I objected to Prof. Riley's descriptions, not because I differed as to the generic references, but because the species were described without structural characters being given, and from the obscure nature of the ornamentation and the great general resemblance among the *Phycidæ*, one can hardly determine a species from a description of the colour and markings alone.

We must wait upon the "Monograph" for the reasons which induce M. Ragonot to call the Family *Phycitidæ* and the typical genus *Phycita*, and not as I have given it, *Phycidæ* and *Phycis* Haw. I have, however, not yet seen a copy of Haworth. I regard the *Phycidæ* or *Phyciinæ* as a sub-family of the *Pyralidæ;* and M. Ragonot's *Anerastinæ* as merely a tribal division of the sub-family. I am not then agreed with M. Ragonot's divisional terms.

I have had no occasion to study M. Ragonot's types. As the generic term *Ciris* (p. 17) is long ago used by me for *C. Wilsonii*, I propose for *discigerella* the name *Ragonotia* after its learned discoverer.

A NOTE UPON AUTHOR'S TYPES.

BY A. R. GROTE.

It has occurred to me to say a few words upon the subject of author's types. It sometimes happens that a specimen is labelled "type," which is not the true type, i. e., the one (or ones) from which the original description was drawn up and which *accords with that description.* This is the criterion for types, that they do not contradict the original description. The late Mr. Morrison sent me at one time a "type" of Harris's *Agrotis tessellata.* Upon my wonder at his having such a specimen, I found it was merely a compared example, but it should not have been labelled "type." To my certain knowledge, Mr. Morrison on occasion labelled as types subsequent material (vide genus *Agrotis*). Only the material at hand and compared when the original description is drawn up, should be labelled as "type." On this head I would say a word as to Walker's types. Only when the evidence is complete and satisfactory should an earlier name of Walker's replace a designation in use. What I call incomplete evidence may be recently offered by Mr. Hulst in proposing to change *Selenia Kentaria.* Dr. Packard it seems had figures drawn from what are supposed to be Walker's types. There is no evidence that these are in every instance the proper types. The cases where more than one species was included by Mr. Walker are not solitary. Dr. Packard interpreted this figure as applying to another form of *Selenia.* Mr. Hulst interprets it differently, and drops a settled name without a question. In whatever way the matter is finally settled, Mr. Hulst would appear to have acted without sufficient evidence, Having studied the original collection

in 1868, during Mr. Walker's lifetime, I am justified in saying that care must be taken that subsequently added specimens are not taken for types. Restitutions should be left to Mr. Butler and the British Museum authorities. The original description must be studied, and facilities other than Mr. Hulst's are needed to make such changes.

ON THE GEOGRAPHICAL DISTRIBUTION OF CITHERONIA.

BY A. R. GROTE, A. M.

I wish to draw particular attention to this genus and its allies. I have, in 1865, drawn a parallel between the group and the Hawk Moths, from the young stages and the peculiar pupation, and in my pamphlet on "the Hawk Moths of North America," I have discussed the probabilities of their relationship. But I here wish to point out that the group is American; that in America we may expect to find old types among that portion of the fauna which is indigenous, pre-tertiary, and to this *Citheronia* belongs. Further than this, the *Ceratocampinæ*, which are tropical continental, or South American rather than North American, but comparatively equally spread to-day, seem to belong to the Eastern portion of the New World. That is, east of the Rocky Mountains, the Cordilleras, the Andes; east of the great rocky back-bone of the continent running from north to south. If this is so, it will further illustrate my remarks on the "Geographical Distribution of North American Lepidoptera," which has recently appeared in the pages of the CANADIAN ENTOMOLOGIST. The sub-family, which I separate from the *Saturninæ* or *Attacinæ*, contains two series of genera or tribes based on larval structare—*Citheronia*, *Anisota* and *Dryocampa (rubicunda* and var. *alba)* standing together, as opposed to *Eacles imperialis* and allies. This sub-family, remarkable for its *form* and habit of pupation, its thick wings, velvety-scaled, its short, sub-simple antennæ, stands lower than the *Attacinæ* or true Emperor Moths, and seems to borrow some characters from the *Cossinæ*. But the larvæ are very different; they approach somewhat *Bombyx mori*, which is the most Sphinx-like larva of all the Spinners, yet spins a cocoon, which *Citheronia* does not. That this group is American and has a comparatively defined range, between the mountains and the Atlantic, are matters of no little interest in the study of the distribution and the origin of our North American moths. In the Annals of the New York Lyceum, colored figures are given by the late Mr. C. T. Robinson and myself of

Citheronia regalis Fabr., *C. sepulcralis* G. & R., and *C. Mexicana* G. & R. The Pine Citheronia, *C. sepulcralis* G. & R., is found from Massachusetts to Florida, but I have not heard of its being taken farther north, or in Canada. It seems to be a rare moth, having been taken by Abbot, who seems not to have known its transformations. It was unknown to science until we described it from material found by the late Mr. James O. Treat, of Massachusetts.

NEW WORK ON JAPANESE BUTTERFLIES.

The task of preparing and illustrating a work upon the Butterflies of Japan, after the model of Mr. Distant's RHOPALOCERA MALAYANA, has been undertaken by Mr. H. Pryer, of Yokohama, who with persistent enthusiasm for the past seventeen years has been engaged in collecting the Lepidoptera of the Empire, and studying their habits. The work, entitled RHOPALOCERA NIHONICA, will appear in three parts, 4to. It is printed upon Japanese "untearable paper," made of a curious combination of the fibres of rice straw and silk. The text is in English and Japanese. The plates are drawn upon stone and printed in colours by native lithographers under Mr. Pryer's own supervision, and are truly excellent. The first part, bearing the imprint of the "Japan Mail" office, is before us. The writer during a recent stay in Yokohama had the privilege of examining a portion of the MS. of the Second Part and the proofs of the Plates which are intended to accompany it. It may be worthy of note that the letter-press of Parts II. and III. will greatly exceed in volume that of Part I.

The Japanese islands, stretching from Shumshù, the northernmost of the Kuriles, in Lat. 50° 40′ N. to the Riu-kiu group in Lat. 24° N., possesss every variety of climate from the semi-arctic to the tropical. The islands of the great central group, Yesso, Nippon, Shikoku, and Kiushiu, are traversed by lofty mountain ranges, and dotted with volcanic peaks, some of which rise from 9,000–10,000 ft., and one of them to 12,450 ft. above sea-level. Upon the summits of these mountains perennial winter reigns, while at their feet a semi-tropical vegetation blooms and flourishes. In addition to the wide diversity in climates which prevails in the islands and the contiguity of colder and warmer climates due to the mountainous character of the country, there are more subtle influences at work depending for their operation upon the rainfall and the aerial currents. The

atmosphere is characterized in spring and early summer by an excessive humidity, surpassing that of the British Islands, while at other periods of the year there is a well marked "dry season." The result of these various facts, taken in connection with the additional fact that at a remote geological period the islands doubtless were connected with the Asiatic and North American mainland, has been the development of a fauna marked by a wonderfully composite character, and revealing to an unusual extent the phenomena of varietal change, and in the case of the insect tribes, seasonal dimorphism. To these phenomena Mr. Pryer has paid especial attention, with the result of ascertaining that not a few of the so-called species erected by recent entomologists, into whose hands Japanese collections have happened to fall, must be relegated to the great and ever-growing mass of synonymical species. This is especially true of the genera *Papilio*, *Pieris* and *Terias*, in which seasonal dimorphism reveals itself most strikingly. The course pursued by Mr. Pryer in massing a large number of forms of the species originally described by Linnaeus as *Terias Hecabe* under the name *Terias Multiformis* Pryer, is open to criticism on the ground that the labour of the elder nomenclator should have been respected and his name retained, while the names of later writers should have been adduced as synonyms. Nevertheless the fact seems to be established beyond reasonable doubt that the species lumped by Mr. Pryer under the newly coined name *Multiformis*, are all mere local or seasonal variations of *Hecabe* L. It was the privilege of the writer to spend many days in Mr. Pryer's laboratory, and he can testify to the painstaking care which he has taken to avoid error in his deductions. The most surprising result of breeding is, however, one which is not alluded to in Part I. of the RHOPALOCERA NIHONICA, since it was only definitely confirmed during the past summer, viz., the discovery that *Terias Bethesba* of Janson is a dimorphic form of *Terias Laeta* of Boisduval. The entire difference in form of the two has naturally led students unhesitatingly to accept them as widely different species. Careful breeding has established their practical identity.

As the first attempt at a comprehensive and accurate survey of a part of the beautiful insect fauna of "Dai-Nippon," the new work will no doubt be hailed with pleasure by all entomologists who raise their eyes beyond the narrow confines of their own immediate neighborhoods, and seek to ascertain the truth as to the whole of Nature.

W. J. HOLLAND, Pittsburgh, Pa.

CORRESPONDENCE.

CALLIMORPHA.

Ed. Can. Ent.—Dear Sir : In reference to my former note on *Callimorpha*, I would state that in my "Check List" the white forms were referred to *Lecontei* as varieties. I was totally unacquainted with what may be a more Northern form, viz., *confusa* Lyman. Mr. Lyman's excellent plate and paper must be commended, but I must *insist* that neither Mr. Lyman (nor Mr. Smith for that matter) have done more than separate the forms in the perfect state ; and in this Mr. Lyman seems to have shown great tact and is the more correct, having made no fresh synonyms. The yellow species commence the series in my Check List, in which *vestalis* and *fulvicosta* are distinguished as different forms or varieties, and I have only to add to my former communication respecting the interchange of yellow and white in this Subfamily, that it notoriously occurs in the sexes of *Leucarctia acraea*. The American species of *Callimorpha* are probably not long separated from an original type—they form to-day a pro-genus, like *Datana*. In such cases where the naturalist attempts to still further separate the species or races as Mr. Smith has done, the work of all previous describers should be studied and certainty attained as to what forms have been already named and what remain without a designation. In all this work there is nothing really original. When some one *breeds* all these forms, as Mr. Edwards does the doubtful Butterflies, there will be a real scientific addition to our present imperfect knowledge.

A. R. Grote.

Dear Sir : Dr. Harris, in his well known work on Injurious Insects, states that the caterpillars of the Callimorphas conceal themselves in the day time under leaves and stones. According to my experience, the larvæ of *Lecontei* and *confusa* may be found on the food plants at all hours of the day. About ten or twelve years ago, *Lecontei* was rather abundant on certain parts of Montreal Mountain, and I observed quite a number of the larvæ, from some of which I reared the moths. I unfortunately neglected to take a description of the larva, nor did I ascertain what the food plant was. When the Mountain was opened as a public park, a carriage drive was cut right through the *Lecontei* ground, and since that time it has become very scarce, and I have so far failed to re-discover the

larva; however, as I have elsewhere stated, I feel confident that careful breeding will prove *Lecontei*, *confusa* and *contigua* to be good species. In his paper on Callimorpha (CAN. ENT., vol. xix., p. 237), Mr. Smith is in error in stating that I "assumed the distinctness of *Lecontei* and *militaris*." I gave *militaris* as a variety of *Lecontei* and assumed the distinctness of *Lecontei* and *confusa*, which is a very different thing, and should have aided rather than misled him. I have found hibernated specimens of *Lecontei* and *confusa* easy to rear, the latter in confinement feeding freely on almost any kind of leaf. Might not these hibernating Arctians be reared by placing them on ice, as Mr. Edwards has done so successfully with the diurnals?

F. B. CAULFIELD, Montreal.

Dear Sir: In reference to Dr. Hagen's recent notice of Calverley's illustrations of Sphingidæ, I would say that the plates are neither "unknown" nor "forgotten," but simply "unpublished." References to their existence may be found in my printed papers. To certain of the figures I furnished the types. Dr. Hagen makes some remarks as to the quality of the illustrations. It is perhaps not remarkable that he does not notice that many figures are copies from Cramer and Drury, and that the plate of *Papilio Calverleyi* is the same as published in Proc. Ent. Soc. Phil., on different paper. Copies of Calverley's Sphingidae were sent to a few principal libraries, hence it is not extraordinary that Dr. Hagen should have found one at Harvard. The work owes its inception perhaps to the zeal of the late Mr. Stephen Calverley, who was a correspondent of Doubleday. The names of its two original authors are remembered in *Limenitis Weidemeyerii* and *Papilio Calverleyi*, as well as *Deilephila Calverleyi* from Cuba. The text should have been written by myself, as at one time at least intended, but the plates were finished at such irregular periods and over so many years (1860 to about 1869) that they were never placed complete in my hands for the purpose.

A. R. GROTE.

ERRATUM.—On page 57 (March No.), line 11 from the bottom, for "vol. xix." read "vol. xx."

Mailed April 10th. Delayed by accidental loss of proofs in transmission.

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DESCRIPTIONS OF TWO NEW SPECIES OF MELITAEAS BELONGING TO NORTH AMERICA.

BY W. H. EDWARDS, COALBURGH, W. VA.

1. M. Brucei.

Male.—Expands from 1.5 to 1.7 inch. Upper side brown-black, marked with spots of red and yellow in transverse bands; there are three well marked varieties, in one of which red predominates, sometimes almost to the exclusion of yellow; in another red and yellow, much as in other allied species; on the third much yellow, very little red; in all the spots are small, so that the black surface is more exposed than in many species.

1. The red form. The spots dull; the common marginal row wholly red, the submarginal row sometimes red on primaries, sometimes red partly replaced by yellow, and secondaries always red and yellow; the third row is red and yellow on primaries, red on secondaries, the fourth row just the reverse of this; at end of cell on primaries a short red and yellow band, in the cell four spots, red and yellow alternately, from the arc, the yellow ones very small; on secondaries, a red stripe along upper side of cell, two small yellow spots in cell; fringes black at ends of the nervules, yellow in the interspaces.

2. The spots of the second row red and yellow on primaries, yellow on secondaries, of the third yellow on primaries, red on secondaries; of the fourth red and yellow on primaries, yellow on secondaries; the two next costa sometimes red on the posterior side; the yellow spots in cell of primaries large, and a large yellow patch below cell.

3. Nearly all spots yellow; the marginal red; no other red on secondaries, or a mere trace of it indicating the spots of the third row, which are otherwise suppressed; the submarginal row of primaries represented by a few scales only, as are also the spots in cell.

On the under side all these forms agree; primaries dull red, almost without black; the marginal spots a deeper red, the next two rows yellow,

the submarginal obsolete on lower half; a yellow patch subapical on costa, another outside arc of cell; the two cellular spots yellow, dusted red.

Secondaries have all the spots clearly defined; the marginal row red, the second row of yellow lunules; the third wholly red; the fourth yellow, the spots of upper half elongated and cut unequally by a black line from costa to lower discoidal nervule; beyond to base red, with a straight row of four confluent spots from costa to submedian, and a fifth at end of cell.

FEMALE.—Expands 1.7 to 1.8 inch.

Varies as the male, but some examples still more widely, the yellow spots being very large. On the under side as in the male, except that some examples have the red submarginal spots of secondaries slightly edged with yellow; in the more yellow upper side examples the yellow edging to these spots is broader, and even sometimes extends along the marginal side.

This small Melitaea has long been known in collections, but till recently I myself have seen few of them, and knew nothing of its localities or habits. Mr. Bruce, who took great numbers of examples, says: "I found it only on high mountain tops (in Colorado); this was strictly the rule. These tops are in most cases extensive plains covered with flowers, chiefly yellow Compositæ, and the Melitaeas in question sit on every blossom in numbers, and are very sluggish—or rather I may say, they sit and cling tightly to the flowers to prevent the brisk wind, that is generally blowing at this elevation, from taking them away. I have never seen them down the slope lower than a few hundred yards. It is an abundant species on the Snowy Range at not lower than 12,000 feet, and must appear early in June, as many of my specimens taken early in July are rather worse for wear."

The species comes also from Montana, Washington Terr., and British America, in the Rocky Mts.

2. M. TAYLORI.

Male.—Expands from 1.6 to 1.8 inch.

Upper side brown-black, the costal margin of primaries next base dusted yellow; marked with red and clay-yellow spots disposed in transverse bands; the hind margins have a common row of red spots, almost

confluent on primaries, and a submarginal row of yellow, usually very small on primaries; on same wings a third row of large yellow spots, and a fourth row red, or sometimes red partly replaced by yellow; around the end of cell and to lower median nervule a yellow row, sometimes obsolete below cell, the remainder appearing to branch from fourth row; in the cell four spots, red and yellow alternately from the arc, and a yellow patch below cell. On secondaries the third row is of large red spots, the fourth of large yellow; a red stripe along upper side of cell and at end; two yellow spots in cell and another below; fringes blackish at the ends of the nervules, white in the interspaces.

On under side the spots are repeated, enlarged, nearly concealing the black ground on both wings; and on primaries are as distinctly defined as on secondaries, the red bright; the spots of common marginal row confluent, of the submarginal large, crescent; the red spots of third row on secondaries have each a slight yellow edging except on the posterior side; next comes a black line, and a row of narrow red spots entirely across wing as in *Rubicunda*, separated by a black line from the dorsal row of yellow spots; thence to base red, with four yellow confluent spots crossing the area from costa to submedian, and a fifth at outer end of cell.

FEMALE.—Expands 2.7 to 1.8 inch.

Like the male on both surfaces.

The preparatory stages of this species were described by me in CAN. ENT., vol. xvii., p. 156, 1885, as of *M. Rubicunda*, H. Edw., but a better acquaintance with both forms makes it certain that they are distinct species, though closely allied. *Taylori* is considerably the smaller, more constant to one type, the spots of under side not light yellow, as in *Rubicunda*, but either white or white with a mere tint of yellow. *Rubicunda* is a very variable species in all its markings.

I have named this Melitaea for the Rev. Geo. W. Taylor, of Victoria, by whose kind aid very much knowledge has been gained of Vancouver butterflies. I received larvæ from Mr. James Fletcher, Sept., 1884, sent him by Mr. Taylor.

These were in hibernation, lived through the winter, were fed on Chelone glabra, the plant of *M. Phaeton*, and some of them pupated and gave butterflies. I related in the paper spoken of that one larva, soon after waking in spring of 1885, became lethargic, and on 23rd May I returned it to the ice box. On 6th July, I brought it to my room, but

after two days, as it had eaten nothing, though it had changed its position, I returned it to the ice box, where it was in good condition on 20th Aug. The larva died some weeks later, instead of passing the second winter as I thought it perhaps might do. Of the extent of territory on the main land occupied by *Taylori*, I am unable to speak.

NOTES ON DANAIS ARCHIPPUS.

BY W. H. EDWARDS, COALBURGH, W. VA.

Now that the observations of my young friend, W. D. Marsh, on this species, have been given in the CAN. ENT. (xx., p. 45), I think no reasonable person can doubt that it is at least three-brooded in New England, and that the late butterflies hibernate there. Very late in the fall of 1887, Mr. Marsh saw individuals flying, long after severe frosts had been felt, and still later, he had butterflies come from pupæ. These late fliers are the hibernators. And early in the spring a hibernator had been seen at Amherst. It seems that Rev. H. W. Parker, when a resident at Amherst, some years ago, saw a hibernated *Archippus*, 12th May, 1871, as appears by his notes published in Am. Nat., vol. vi., 115. This mention had been lost sight of, but has recently been re-discovered by Mr. Scudder, who called my attention to it. Of course this settles the matter, taken together with the observations of Mr. Marsh, as to *Archippus* hibernating in Mass.

Mr. Marsh has stated, and it is an original observation on his part, so far as I know, that a great destruction of *Archippus* larvæ takes place in the fall, owing to the prevalent custom in New England of cutting the grass a second time. Were it not for that, probably hibernated imagos would be as abundant in the spring as they are in West Virginia.

I asked Miss Emily L. Morton, residing at Newburgh, N. Y., to make observations there on *Archippus*, for Newburgh is in sight of the hills of New England, and it is not to be supposed that the behavior of any species of butterfly would be different at Newburgh, in the latitude of Northern Connecticut, from what it would be inside the bounds of New England. Miss Morton wrote me that she had taken hibernated *Archip-*

pus on 3rd, 4th May (1887), at lilac blossoms, and that at the date of writing, June 27th, fresh males of the first brood of the imago were flying. Mr. Marsh says that at Randolph, Vt., far to the north, a fresh male was seen a week later, on 4th July.

On 16th August, Miss Morton wrote that a new brood of the butterfly was flying in abundance. Mr. Marsh says that at Randolph, 2 ♀, 1 ♂, perfectly fresh, were taken 11th August.

On 20th Sept., Miss Morton wrote: "Fresh examples are emerging every day now, and there are numbers of them in the clover field." Mr. Marsh says: "From 30th Sept. to 15th Oct., butterflies from pupæ bred from said larvæ emerge, and besides, many pupæ were found in the fields and the imagos came from them." So running parallel to Miss Morton's account.

On 9th Oct., Miss Morton again wrote: "On 6th and 8th of this month, we saw numbers of perfectly fresh examples of *Archippus*. We caught several, and in some the wings were still quite fresh, showing their recent advent from chrysalis. On none were there any signs of age." And she adds: "These are doubtless the hibernators." Mr. Marsh had imagos out of bred pupæ so late as 29th Oct. and 4th Nov.; and saw butterflies on the wing on 5th and 13th Oct. The history is identical in New England and eastern New York.

Years ago I followed up the life history of *Archippus* carefully in West Virginia, and in Psyche, vol. 2, p. 169, 1878, and CAN. ENT., xiii., 211, 1882, I showed that the hibernators of this species came out of winter quarters as early as other hibernating butterflies, and with them gathered about the first blossoms of the year, which here are on the wild plum and cherry trees; that eggs were to be found, and old females were to be seen ovipositing on milkweeds but just out of ground; that in a very short time the old hibernated individuals had totally disappeared, undoubtedly dying soon after laying their eggs, as is the invariable rule with butterflies; that within a month a generation fresh from pupae was flying; and that so, certainly three, possibly four, generations of the butterfly followed the hibernators. In fact, that the habits of *Archippus* were in no way abnormal, nor was the species so long lived as others where there is but one brood per year in descent from the hibernators (as for example, in Grapta *Faunus*).

I made observations myself here at Coalburgh last season, to some extent, on this species. I found an egg 10th May, on an Asclepias but

four inches high. On 27th May, I found a pupa hanging to the outer side of a rail, as I crossed the railway to my garden. I then, in the fall, searched daily for eggs, to see how late they were to be found. On 2nd Sept., I found 2 eggs; on 4th, 1; on 8th, 1; on 10th, 1; on 14th, 1, and saw the female lay this egg; on 16th, found 3; on 20th, 2; on 22nd, 1. I found no eggs later than this. Mr. Marsh found larvæ up to 30th Sept., though he obtained no eggs apparently later than 5th Aug. But the eggs to produce his late larvæ must have been laid early in September. On 26th and 27th Sept., I had occasion to drive many miles, and saw great numbers of the fresh butterflies flying about the Actinomeris flowers. My last imago, from one of the eggs found, was 12 days in pupa and came out 11th Oct. So that the butterflies were coming out of pupæ later, if anything, at Amherst than they were at Coalburgh.

It had been said that no one ever found an *Archippus* egg in New England, or on very young Asclepias plants, that could have been laid by an hibernator, though thousands of plants had been searched, at different localities, by many persons. Negative evidence is no evidence at all in such a case. If one thousand plants had failed to produce an egg, the one thousand and first plant nevertheless might have it. The hibernated females are very few, as there is every reason to believe, after hearing of the wholesale destruction over large areas of country of the late larvæ; and Asclepias plants are exceedingly plenty in the spring, thousands of them to one *Archippus* egg, no doubt. So that a person might very possibly look all day and not find an egg. And on the other hand, the first plant touched might have an egg on it. That the eggs are there is sufficiently proven by the resultant butterflies.

ON THE NATURE OF SEASONAL DIMORPHISM IN RHOPALOCERA.

BY T. D. A. COCKERELL, WEST CLIFF, COLORADO.

In studying the seasonal variation exhibited by various species of butterflies, I have been struck by the fact, that whereas in most instances the form emerging in the spring is darker and smaller than the summer brood, there are also exceptions to this rule, in which the vernal emer-

gence is the lighter. Take, for instance, the genus *Pieris*. The vernal broods of *P. napi* and *P. protodice* are distinctly more dusky than those which have undergone their whole metamorphosis in a single season ; but, on the other hand, the spring emergences of *P. rapæ* and *P. brassicæ* are wont to be pale, and the spring-emerging *P. virginiensis* is pale, and as Mr. W. H. Edwards remarks ("Papilio," 1881, p. 97), more like the summer than the winter form of its progenitor *P. napi*. In Japan, it would appear ("Entomologist," 1888, p. 24,) that the vernal form of *P. napi* is less dusky than the summer emergence.

Hitherto it has been held by the majority of Entomologists that the darkening of vernal forms was due to the cold to which the pupæ were subjected during the winter, and this view seemed to receive ample confirmation when Mr. W. H. Edwards proved experimentally that cold applied to pupæ did produce darkening of the forms.

Supposing, then, that cold is the sole cause of the darkness of vernal broods, why are not *all* vernal broods dark, since they have all been subjected to a greater amount of cold in the pupa-stage than the summer ones?

It seems to me that this question is unanswerable on the supposition that duskiness is the simple effect of cold, and I have therefore been led to seek another explanation of the phenomenon.

On one occasion, I bred a specimen of the European *Geometra papilionaria* Linn., and paid particular attention to the appearance of the pupa before emergence. I noted that although there could be no doubt that the vital organs of the body were gradually formed during a considerable period before emergence, the wing-pigments did not begin to be developed until the last few days. First of all the pigment appeared brown, and only just before emergence did it assume the vivid green characteristic of the insect.

Now suppose that *G. papilionaria* were a species hybernating in the pupa-state, how would cold effect the formation of the wing-pigment? Obviously, not at all, since the pigment is not called into existence until a short time before emergence, that is to say, not until the warm spring sun has wakened the sleeping pupa into new life.

I have not had the opportunity of making careful observations of a similar kind with the pupæ of Rhopalocera since I began to pay special attention to the subject, but I think it will generally be accepted as a fact

that the wing-pigments are not formed until a short time before emergence. In all the cases of which I have recollection this has been so.

But I imagine that the ratio between the growth of the wing and the metabolism of its pigment is not always the same, nor is that between the wing-formation and the growth of the vital and reproductive organs constant, and herein I believe lies the key to the solution of the problem.

Rapid metabolism produces darkness of colour, while slow change accompanied by growth gives rise to a larger expanse of wing, on which the pigment is paler, lighter, and often more brilliant.

The vital and reproductive organs of a butterfly will develop *sooner and at a lower temperature* than the pigment of the wings; and hence in a country where the winters are cold and the summers hot, the hibernating pupæ will have reached a nearly full development by the time the warm weather comes on, except as regards the pigment of the wings. This will undergo very rapid metabolism to be ready by the time of emergence, and the result will be a dusky and small winged form. On the other hand, if the spring comes gradually, and the winter is warm, the wing-pigment will develop more slowly, the wings will have longer to grow, and consequently the vernal brood will be paler even than that of the summer.

And this is precisely what we find; *Pieris virginiensis* is a *pale* spring form taking the place of the *dark oleracea-hyemalis* of the more northern portion of the continent, while *P. rapæ* and *P. brassicæ*, which do not exhibit dusky vernal broods, are natives of Europe, where the winters are milder and the advent of spring more gradual than in North America.

It may here be objected, why are not tropical species, whose development is often excessivly rapid, uniformly dusky or black? That they are in many cases darker than their representatives in more temperate regions will I think be admitted, but I would point out that they are not by any means in the same position as North American vernal forms. The vital organs must in any case take a certain time for development, which is always longer than that necessary for the metabolism of the pigment. So that in the case of any summer brood, however rapidly developing, the temperature being high enough to allow the development of the pigment at the same time as the organs of the body, it has ample time for sufficient metabolism—less indeed than in the case of a warm and gradual spring, but more than in that of a frigid winter and quick coming summer, where

emergence must rapidly follow the first wakening to life by the hot rays of the sun.

So I believe that sudden warmth after a period of prolonged cold, and not the cold itself, is the cause of the duskiness of North American vernal forms of Lepidoptera, and I will not hesitate to advance the same reason for the darkness of Arctic species, and of Mr. W. H. Edwards's specimens which he experimentally subjected to cold. I cannot prove anything as yet, but I put forward this theory, which has commended itself to me, in the hope that your readers, who have had much more experience in practical entomology than I, may be able to put it to the test, and either prove its accuracy, or propose some other which may serve better to explain the facts.

I believe there is a phase of melanism caused by moisture, quite distinct in its nature from the duskiness dealt with in the present paper, but I have already dealt with this question elsewhere ("Entomologist," 1887, p. 58,) and need only point out the distinction here. It becomes every day more evident, in dealing with colour-variation. that different colours do not necessarily denote essentially different pigments, and seeming identical colours may be quite unlike in their composition, though we at present do not know precisely what that is.

CAPTURES MADE WHILE TRAVELLING FROM WINNIPEG TO VICTORIA, B. C.

BY REV. W. J. HOLLAND, PH. D., PITTSBURGH, PA.

It was my privilege last summer to accompany the expedition sent out by the National Academy and the U. S. Navy Department to Japan for the purpose of observing the total eclipse of the sun which took place upon the 19th of August, 1887. The route selected by our party was the one just opened to the far East over the Canadian Pacific R. R., and I was the first passenger booked in Chicago for Yokohama, and my colleague, Prof. Todd, was the first passenger booked in Boston for the same port, over the new line. We left Winnipeg on the morning of June 13th, and were borne westward without any detention until the 15th, when,

owing to the fact that the railroad bridge at Duthil had been partially carried away by a freshet in the Bow River, we were compelled to lie at Canmore Station for about twenty-four hours. The delay was rather acceptable to me, as it enabled me to do a little collecting in a region wholly new to me. We reached Vancouver upon the evening of June 17th, and on the morning of the 19th were courteously permitted by Captain Marshall, and Captain Webber, the Naval Superintendent of the Can. Pac. R. R., to go to Nanaimo, on Vancouver Island, where the "Abyssinia" took on her coals. Upon the morning of the 20th, while the "black diamonds" were being poured into the hold of the great ship, I took refuge from the dust and discomfort which prevailed on board, and with the assistance of a couple of Indian lads, spent two hours in collecting specimens a few hundreds of yards from where the ship was tied up to the shore. My captures consisted exclusively of Coleoptera. I saw a specimen of Argynnis, and a fine male of *Papilio Eurymedon*, but neither came within reach of my net, and after giving chase for a moment, I reverted to the more profitable task of gathering the beetles, which appeared to be abundant. The result of my collecting at Canmore and at Nanaimo is given in the accompanying lists. I am indebted to my good friends, Dr. John Hamilton of Allegheny, and Dr. Geo. H. Horn of Philadelphia, for the determination of the Coleoptera.

Species Collected at Canmore, June 15th, 1887.

LEPIDOPTERA.

1. *Papilio zolicaon*, Boisd., 1 ex.
2. *Colias* var. *occidentalis* ♂ 1 "
3. *Thecla Irus*, Godt., 4 "
4. *Lycaena antiacis*, Bdl., 13 "
5. " *amyntula*, Bdl., 7 "
6. *Phyciodes Montana*, Behr., 1 "
7. *Argynnis Freya*, Thnb., 2 "
8. *Erebia Epipsodea*, Butl., 1 ex.
9. *Chionobas Chryxus*, Dbly.-Hew., 1 ex.
10. *Nisoniades Icelus*, Lint., 3 "
11. *Heliothis*, sp., 2 "
12. *Rheumaptera*, sp., 1 "
13. *Eupithecia*, sp., 1 "
14. *Nephopteryx*, sp., 1 "

COLEOPTERA.

1. *Pterostichus Luczotii*, Dej., 1 ex.
2. *Trichodes ornatus*, Say, 2 "
3. *Dichelonycha Backii*, Kirby, 39 "
4. *Acmaeops pratensis*, Laich., 3 ex.
5. *Saperda tridentata*, Oliv., 1 "
6. *Lepyrus gemellus*, Kirby, 1 "

At North Bend Station, B. C., after lunch, I succeeded in taking before the train started four specimens of *Cicindela Oregona*, Lec.

My search for Lepidoptera and Coleoptera at Canmore was interfered with by the presence of larger game, and I was so much engrossed by the chase of a lynx that I neglected my entomological opportunities, as I have now occasion to regret, inasmuch as the lynx in the end proved missing.

List of Coleoptera taken at Nanaimo, June 20, 1887.

1. *Notiophilus Sibiricus*, Mots., 1 ex.
2. *Pterostichus lustrans*, Lec., 1 "
3. *Amara fallax*, Lec., 1 "
4. *Harpalus rufimanus*, Lec., 1 "
5. *Anisodactylus Californicus*, Dej., 1 "
6. *Silpha Lapponica*, Hbst., 1 "
7. *Coccinella sanguinea*, Linn., 5 "
8. *Anatis Rathvoni*, Lec., 1 "
9. *Psyllobora taedata*, Lec., 3 "
10. *Scymnus Phelpsii*, Crotch, 1 "
11. *Trogosita virescens*, Fab., 24 "
12. *Peltis Pippingskoeldi*, Mann., 3 "
13. *Adelocera profusa*, Cand., 1 "
14. *Alaus melanops*, Lec., 1 "
15. *Cardiophorus tenebrosus*, Lec., 1 "
16. *Elater apicatus*, Say, 1 "
17. " var. *phoenicopterus*, Germ., 1 "
18. *Agriotes Thevenetii*, Horn, 1 "
19. *Dolopius lateralis*, Esch., 2 "
20. *Melanotus fissilis*, Say, 1 "
21. *Limonius Californicus*, Mann., 1 "
22. *Athous vittiger*, Lec., 1 "
23. " n. sp. (*fide* Dr. Horn) 1 "
24. *Corymbites fallax*, Say, 1 ex.
25. " *inflatus*, Say, 1 "
26. *Chalcophora angulicollis*, Lec., 9 "
27. *Dicerca tenebrosa*, Kirby, 1 "
28. *Buprestis aurulenta (lauta)* Lec., 33 "
29. *Melanophila longipes*, Say, 10 "
30. " *Drummondi*, Kirby, 18 "
31. *Chrysophana placida*, Lec., 1 "
32. *Podabrus piniphilus*, Esch., 2 "
33. *Telephorus Curtisii*, Kirby, 1 "
34. " *divisus*, Lec., 1 "
35. *Clerus sphegeus*, Fab., 7 "
36. *Ptilinus basalis* ♂, Lec., 1 "
37. *Ceruchus striatus*, Lec., 2 "
38. *Asemum atrum*, Esch., 3 "
39. *Tetropium velutinum*, Lec., 2 "
40. *Xylotrechus undulatus*, Say, 1 "
41. *Rhagium lineatum*, Oliv., 1 "
42. *Leptura obliterata*, Hald., 1 "
43. " *chrysocoma*, Kirby, 1 "
44. " *scripta* (var. *a*) Lec., 2 "
45. *Syneta albida*, Lec., 1 "

46. *Haltica bimarginata*, Say, 23 ex.
47. *Phellopsis porcata*, Lec., 1 "
48. *Eleodes cordata*, Esch., 7 "
49. *Iphthimus serratus*, Mann., 5 "
50. *Platydema Oregonense*, Lec., 4 "
51. *Helops pernitens*, Lec., 1 "
52. *Cistela variabilis* (var. *c*) Horn, 1 "
53. *Anaspis atra*, Lec., 8 ex.
54. " *rufa*, Say, 1 "
55. *Eurygenius campanulatus*, Lec., 1 "
56. *Rhynchites bicolor*, Fab., 3 "
57. *Amnesia granicollis*, Lec., 1 "
58. *Sciopithes obscurus*, Horn, 1 "
59. *Dorytomus luridus*, Mann, 2 "
60. *Orchestes canus*, Horn, 1 "

While lying in the harbor of Victoria for a few hours, during which I did not have the privilege of going ashore to collect, I climbed to the main-top of the steamer, and while sitting at the cross-trees a specimen of *Pachyta liturata*, Kirby, came flying toward me and settled on my arm. It was promptly captured and tied in a corner of my handkerchief, and is now embodied in my collection. Numerous specimens of *Melanophila longipes* also came on board and sought refuge in the seams between the planking of the deck. I caught a dozen or more, and for two days afterwards, when fully six hundred miles off the coast, a stray specimen would now and then turn up upon the spray-swept deck of the vessel.

The success which attended my efforts to collect at Nanaimo reveals the richness of the locality. I was absent from the steamer about two hours, from 7.30 a. m. until a little before 10 a. m. My collecting was all done in a little clearing made by an Indian for the purpose of planting a few rows of beans and potatoes. The area covered did not exceed 75 yards square. The sun was shining brightly, and about the trunks of the freshly fallen fir trees and under their bark the Buprestidæ and Elateridæ were particularly abundant. It was with pleasure that I recognized *Trogosita virescens* in this high northern latitude, as heretofore it has been represented in my collection mainly by specimens from Florida. Most of the specimens have dark blue elytra, but a few have the typical green. I trust at some future day to be able to explore patiently and thoroughly the length and breadth of Vancouver Island and the coast of British Columbia lying to the East and North.

STRAY NOTES ON MYRMELEONIDÆ, PART 4.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

(Continued from vol. xx., page 74.)

8. *Brachynemurus Carrizonus* Hag., n. sp.

Yellow with black lines; face yellow, above with a transversal narrow black band, separated by a yellow crescent from the antennæ, and by a narrow yellow line between the antennæ from the vertex; a faint median black line goes from the black band nearly to the clypeus; labrum yellow; palpi short, pale yellowish, maxillary with apical joint, cylindrical, black except on tip, the two preceding joints with a brownish mark in the middle; labials a little longer, apical joint hirsute, black shining except on base, fusiform, thickened, the apical third thin, pointed; on the inflated part an ocelius like spot. Antennæ not fully as long as head and prothorax, strong, clavate, black, faintly annulated, the two basal joints shining brown below, yellow above, club luteous; antennæ of female shorter, club broader; vertex elevated, rounded, yellow, before a yellow transversal band; above two black transversal bands, the last one dilated behind on each side of the middle to a larger triangular or square spot; one specimen with the anterior band interrupted in the middle. Prothorax little longer than broad, rounded before, yellow with four black longitudinal bands, the internals approximate; space between the externals with a yellow band, or divided in two elongate spots; the two externals sometimes broader near the head, and a little divergent; one specimen has the externals reaching only the transversal furrow. Mesothorax black, with two anterior yellow dots and some near the wings, two yellow angular bands divided from behind on the disk; the hind part yellow with two black approximate anterior spots; metathorax similar but the yellow predominant; sides of thorax black with yellow marks.

Abdomen slender, of male longer than wings, very finely clothed with white hairs, black, the two basal segments above yellow with a broad black median band, the following similar, but the black band broader; the last four segments black; appendages pale with long black hairs, as long as the last segment, slender, a little incurved; the last segment below at the end with numerous long black hairs; it can not be ascertained if among the hairs is a triangular plate; abdomen of female a little shorter

than the wings, the yellow lateral marks on all segments ; genitals yellow, superiors split with two transversal rows of strong black spines ; below two very small cylindrical appendages.

Legs short, yellowish, strongly sprinkled with black and with black hairs, tip of tibia, of third and apical joint of tarsus black, fourth entirely black ; spurs brown, incurved, as long as the two basal joints.

Wings hyaline, pterostigma small, yellowish white, interiorly a dark dot ; only the last costals before it forked ; venation dark, largely interrupted with white ; along the mediana and submediana the costals marked with dark, also the base of the small forks on the apical and hind margin of the front wings.

Length of body, male 35 m.m. ; female 25 m.m. ; exp. al., 45 to 50 m.m.

Habit., Carrizo Springs, Dimmit Co., Texas, just on the border of Mexico ; two males, three females.

It has the appearance of a smaller form of *B. peregrinus.* A larger male, length 38 m.m., exp. al. 60 m.m., is apparently just transformed, with the colors not yet finished, from Tusco, Arizona. I can not separate it from the Texan species.

9. *Brachynemurus Sackeni* Hag., n. sp.

Yellow, variegated with black ; face yellow, with two oblique ovoid black spots near the antennæ ; labrum yellow ; palpi brownish, maxillary with the last joint cylindrical ; labials little longer, last joint fusiform and black on the basal half, with a few hairs ; antennæ longer than head and thorax, black, faintly annulated, clavate, more luteous on tip, below dull, the two basal joints brown shining ; vertex elevated, rounded, black with whitish hairs in front ; yellow with two lacerated black spots on top, which unite anteriorly, surrounding a median heart-shaped yellow spot, two yellow dots behind it, sending to occiput on each side a fine black line ; a black dot near each eye. Prothorax as long as broad, yellow, with two black median lines, separated by a fine yellow line, which is enlarged behind ; on each side a black interrupted line, and a similar one shortly before the side margin, which is clothed with white hairs ; below a black band near the side margin ; mesothorax blackish-fuscous, on each side a yellow maculose band, and some dots ; besides three small black shining dots on each side ; the posterior middle part bright yellow, with three

black dots behind, and two in the anterior corner similar to the ocellus-like spots of *M. conspersa;* metathorax yellow, divided by black cross lines; sides largely black; thorax between the wings and legs black with many yellow spots and stripes. Abdomen of male slender, longer than wings, densely clothed with long black villosity; black, each segment with a large yellow spot in middle, a yellow band at the apex, and a yellow band, except on the three last segments, on base; appendages, long 4 m.m., full as long as the two last segments, thin, cylindrical, a little incurved, clothed with long black hairs; between and below a short pyramidal tubercle with longer hairs. Abdomen of female similar, as long as the wings; genitals with a row of black spines, appendages brownish.

Legs very slender, short, pale, hairy, sprinkled with black, femur and tibia with a more or less distinct black ring at base and before tip; tibia with the three last joints black at tip, fourth nearly entirely black; spurs brown, as long as first joint.

Wings slightly fumose; pterostigma whitish after a darker spot; only few of the costals forked before it; venation black, largely interrupted with pale; some transversals near the mediana and submediana, and the small forks near tip and hind margin more or less fumose; hind wings less marked; venation and hind margin villous.

Length of body, male 35 m.m.; female 25 m.m. Exp. al. 40 to 50 m.m.

Habit.—Texas, Dallas, Boll, and Waco by Belfrage, May 3 to 7; June 10. California, San Francisco, O. Sacken and Austin; Tucson, Arizona. Seven males and two females.

Two females from Colorado, sub-alpine, July, length 35 m.m.; exp. al. 58, can not be separated from the males, except the larger size; the description agrees fully, the legs and wings are stronger marked; the abdomen is as long as the wings, the genitals with a row of strong black spines, the small appendages yellow. The greatest breadth of the wings is 9 m.m. where it is of the males only 6 m.m.

10. *Brachynemurus longipalpis* Hag., n. sp.

Pale yellow, marked with black; face very pale yellowish, with a small black median spot above; sometimes between the eyes and the base of the antennæ a faint black stripe and another one on the inner side of the base of the antennæ; labrum pale yellow; maxillary palpi pale, of com-

mon size and shape; the apical joint longer than the others, cylindrical, tip a little pointed, light brown; labial palpi of unusual length, longer than the head, about 3 m.m.; second joint about thrice the length of the last maxillary joint, much stronger, hairy, a little incurved, suddenly thickened above just before tip, where it is brownish; last joint as long as the second, strongly clavate before the short, fine, cylindrical tip, hairy, yellowish inside, externally brown, blackish on the club. Antennæ nearly as long as head and thorax, strong, thicker to tip, fuscous, annulated with yellowish, the two basal joints and basal half of antenna below yellowish; vertex elevated, pale yellow, on top a transversal black line interrupted in the middle, where is a black spot, and a second transversal line formed by four black spots, besides some black dots near the occiput. Prothorax a little longer than broad, narrowed before and rounded; pale with whitish villosity; two fuscous longitudinal bands, approximate and reaching the front margin; on each side, more distant, a fuscous band, ending in the transversal furrow with a black spot; below along the side margin a black stripe; mesothorax pale yellow with short black bands, forming three forks, open behind, and a similar on the hind middle part; metathorax with a black cross; sides of the thorax yellow, with a black maculose longitudinal band. Abdomen of male considerably longer than the wings, slender, with whitish villosity, intermixed with brown hairs on the apical half, fuscous below, above with a broad yellow band, divided by a fuscous line on the segments 1 to 4; a yellowish median line on the three last segments, and some lateral marks; appendages very short, cylindrical, going downwards, a little divergent, yellow with a black stripe above, strongly clothed with black hairs. I can not find below them any middle part or plate. Abdomen of female as long as the wings, blackish-fuscous, with two yellow dorsal bands from the third segment to apex; genitals light brown with a row of strong black spines; below two short cylindrical appendages with long black hairs. Legs short, pale yellow, moderately sprinkled with black, with strong black spines and on the interior of the anterior femora with white spines; tibia with a fine black ring near the base; tip of tibia and all joints of tarsi black; spurs brown, strong, as long or a little longer than the two basal joints. Wings hyaline, pterostigma white after a brown spot; costals simple, a few forked before the pterostigma; veins fuscous interrupted with pale, near the submediana fumose, forming a more or less visible longitudinal dark line; near the

hind margin and along the gradate veins parallel to tip slightly fumose; venation and hind margin villous; hind wings hyaline.

Two females from Nevada have more variegated front wings; nearly all the oblique veins below the submediana, the forks along the hind border are more infumate, which makes the wing look strange; the femurs of hind legs fuscous.

Length of body, male 38 m.m.; female 26 m.m.; exp. al. 48 to 52 m.m.

Hab., California, Cap San Lucas, by Xanthus de Vesey; Humboldt Station, Nevada, July 29, by O. Sacken. Of the 9 specimens before me, 7 are from California (one female), all alike; the two females from Nevada are stronger colored, but otherwise not different. The great length of labial palpi is a character not to be found in another species.

NOTES ON LYCAENA PIASUS, Boisd.

BY W. G. WRIGHT, SAN BERNARDINO, CAL.

This is in California the first butterfly to emerge in the spring, appearing in February, though it is the accepted representative of the Eastern *Neglecta*, which is not the first to appear there. *Piasus* is double brooded; the second brood coming in the latter part of April, and between it and the first brood a few days intervene when no *Piasus* are seen. Both broods are very fond of water, being always found on damp sands of wet places, and at the brookside crossings. They are also often seen feeding on willow blossoms. A large series gives a uniform expanse of 1.1 inch. I can detect no difference in the markings or size of the two broods.

The larval food-plant of *Piasus* is the buds of *Adenostoma fasciculatum*, an anomalous genus which has no representative, even approximate, in the Eastern States. The Spanish name is "chamiso," which is Anglicized into "chemise." It is a heath-like plant, 4 to 6 feet high, resembling a juniper bush more than any other Eastern plant. Every part of it is brittle, dry, and rather resinous, burning freely when quite fresh and green. The leaves are very small, round like pine needles, and evergreen; they grow all along the stems in little bunches or "fascicles," whence the specific name. The flowers are minute, profuse, in dense terminal racemes on the tips of the twigs, white, scarcely or not at all fragrant, though forming one of the chief sources of honey in the country,

and it is notable that while the plant is abundant and flowers so profusely as to whiten the landscape, the seeds have never been found. It grows upon the dry hillsides and covers uncounted square miles of waste land.

This plant, growing at a distance from the usual haunts of *Piasus*, is that butterfly's food plant. While the flower buds are as yet but in their merest infancy, the female *Piasus* of the first brood deposits her eggs, singly, on the bud and between it and the stem. The female of the second brood finds the flowers in blossom. The egg is white, round, flattened, with a depressed point in the center, like other Lycaena eggs.

While *Adenostoma* is entirely foreign to any plant in the Atlantic States or Europe, it is placed by botanists in the Order Rosacæa, and among eastern plants those nearest it are: *Alchemilla*, "lady's mantle;" *Agrimona*, "agrimona," and *Poterium*, "burnet," though all of these are very unlike in appearance to *Adenostoma*. It is possible that the buds or the immature seeds of other Rosaceous plants might feed *Piasus* larvæ, as cherry, plum, strawberry, etc.

CORRESPONDENCE.

WIND-VISITING MOTHS.

Dear Sir: I have given in the CANADIAN ENTOMOLOGIST a preliminary list of those moths which do not breed continuously in our North American Territory, as defined by Leconte. It has been my theory, stated in numerous papers within the past fifteen or twenty years, that a number of species of moths, found as moths within our limits, are wind visitors. I have been at some pains to point out that the Cotton Worm Moth is, so far as the Central Cotton Belt is concerned and the territory north of this, only a summer breeder, and that it is winter-killed over the larger portion of our continent over which it flies. I ascertained, while in the employ of the Agricultural Department, that, on the coast of Georgia, the earlier or later appearance of the Cotton Worm depended, at least in some seasons, upon the average direction and force of the wind. No continued observations could be taken, but as the general course of the wind is from south to north during the summer, what I heard agreed with my previously published conclusions. My theory as to the Cotton Worm has been ingeniously covered up in his Reports by

Prof. Riley, but I refer to my statements in print and to the fact that the line of continuous breeding is yet unfixed, while it is the primary object to be ascertained by practical entomologists. On page 56 of this volume, Mr. Smith "dissents from the idea" that certain Sphingidæ or Hawk Moths determined from our territory by Mr. Edwards should be taken into our fauna in papers on our fauna. He demands that the right should be made clear by ascertaining that the insect breeds within our territory. I agree with Mr. Edwards that we should take all species found within our territory into our lists and treat them as belonging to our southern fauna, until it is proved that they do not breed with us; and *then* with the remark that they do not breed, but are merely wind-visitors as moths. How can we pass over such a fact, as their being found with us, in silence? Again, seeing the large extent both of our territory and of our ignorance of the conditions under which our moths live, how can we pronounce whether or no these moths may not be summer breeders, or occasional breeders? Who knows that *Philampelus typhon* does not breed seasonally in Arizona? Mexican moths are probably more often found in Texas than we have yet any idea; and Cuban in Florida. Mr. Roland Thaxter has bred the Spanish moth, *Euthisanotia timais* in Florida. This is quite a pronounced tropical form. The moth in numbers is beaten by the wind into the light-houses on the coast at least as far north as New Jersey, probably much higher up. We must keep a busy record of the habits of these moths to understand their geographical distribution and their habits. Any ignoring of them in monographic works will tell against the completeness of such works, while the moths, unhindered by the defects in our literature, will wing their way northward and become at least adopted citizens of our domains every summer. As to the Hawk Moths, the Blue and Green Hawk *(labruscæ)* has been taken in Missouri and in New Jersey. Tropical species of the Owlet Moths allied to *Erebus odora* have been taken so far north as Wisconsin, coming up the valley of the Mississippi. I refer the student to my general paper on the Geographical Distribution of our Moths in these pages, and I earnestly hope that all our wind-visitors will be catalogued, described and put on record, since it seems to me we can get no complete picture of our fauna without them. The limit of their continuous breeding must be ascertained, as also of their summer migrations. Do not our ornithologists take into their works and

distinguish between continuous residents, summer breeders, and birds of passage? These moths are our birds. The ornithologists have already a trinomial nomenclature, which we may come to use in time. After awhile the most self-important classificator will come to appreciate the fact, that the laws of Nature are of general application, and that the value of Natural Science is tested by its ability to broaden our views and widen our understanding. It is clear we must compare our results with those reached in other branches of Natural Science.

A. R. GROTE, Bremen, Germany.

A RARE MOTH.

Dear Sir: Permit me, in the pages of your valuable journal, to record the capture here of an interesting moth,—the rare and beautiful *Hepialus auratus*, Grote. Towards the close of last July, while strolling through a cool shady ravine at Lancaster, near this city, I came upon my treasure resting upon the leaf of a wild gooseberry bush that grew on a knoll, surrounded by as rich a growth of vegetation as nature can well produce in this latitude. As it hung to the leaf with its wings steeply closed over its back, and the tip of its long body elevated, it was a very difficult object to detect; and in the deep shade in which it occurred, greatly resembled a yellow, partially dead, leaf. The well known larvæ of *Grapta progne*, which feed on this plant, derive perhaps some protection from a similar coloring. May not this circumstance indicate the gooseberry as the food-plant of the golden *Hepialus?* The type specimen of this species was taken by the late Mr. W. W. Hill in the Adirondacks, July, 1877, and was described by Mr. Grote in the CAN. ENT., vol. x., page 18. As I find no reference to the capture of another example, I presume the present to be its second recorded occurrence.

E. P. VANDUZEE, Buffalo, N. Y.

CELIPTERA BIFASCIATA, BATES.

Dear Sir: Mr. John B. Smith has compared my types of *Celiptera bifasciata*, described as a new species in the CAN. ENT., May, 1886, page 94, and informs me that it is evidently identical with *Phurys vinculum*, Guen.

J. ELWYN BATES.

Mailed May 2nd.

The Canadian Entomologist.

VOL. XX. LONDON, JUNE, 1888. No. 6

DESCRIPTIONS OF SOME NEW NORTH AMERICAN CHALCIDIDÆ.

BY WILLIAM H. ASHMEAD, JACKSONVILLE, FLA.

Sub-family ENTEDONINÆ.

Astichus Forster.

(1) *Astichus arizonensis* n. sp.

♂. Length .04 inch. Steel blue, finely scaly, with a slight metallic tinge on thorax; the knees and tarsi white. Antennæ dark blue, the funicle joints excised, pedunculated, with whorls of very long hairs. Wings hyaline; veins pale, the marginal vein very long.

Hab.—Arizona.

Holcopelte Forster.

(2) *Holcopelte missouriensis* n. sp.

♀. Length .09 inch. Rather robust. Vertex of head, thorax and metathorax cupreous; face, thorax beneath and at sides, and the abdomen all blue. The scape of the antennæ, excepting at tip, and all the legs, excluding the blue coxæ, waxy white; flagellum blue-black, pilose. The head is punctate, thorax and scutellum scaly, the latter longer than wide with a median groove; metathorax with two delicate parallel keels. Abdomen petiolate, truncately rounded at apex, the second segment occupying most of its surface. Wings hyaline; veins pale brown.

Hab.—Missouri.

(3) *Holcopelte Popenoei* n. sp.

♀. Length .09 inch. All of the head, the thorax, mesopleura and coxæ bright cupreous. Head and thorax punctate; scutellum delicately scaly with a median groove. The scape of antennæ, excepting at tip, and legs yellowish white; flagellum cupreous. Abdomen as in *H.*

missouriensis, blue-black, with a slight æneous tinge near the base, in certain lights. Wings hyaline ; veins pale.

Hab.—Kansas. Prof. E. A. Popenoe.

Both of the above species seem to approach quite closely to *H. albipes* Prov.

(4) *Holcopelte floridana* n. sp.

♀. Length .08 inch. All black, shining, excepting a slight æneous tinge on thorax. The trochanters, apices of femora, all tibiæ and tarsi, white. The head and thorax very delicately punctate ; scutellum smooth with a median groove. Abdomen petiolate, pointed ovate, the second segment occupying most of its surface, the following segments short, but all distinctly visible. Wings hyaline ; veins brown.

Hab.—Florida.

(5) *Holcopelte microgaster* n. sp.

♂. Length .05 inch. Blue-black, smooth. Scape of antennæ, coxæ and metathorax, distinctly blue. Funicle æneous. The femora, excepting tips, blue ; tibiæ and tarsi white, the former with a brown blotch. Wings hyaline ; veins yellow.

Hab.—Missouri.

Reared from a Microgaster cocoon.

Pleurotropis Forster.

(6) *Pleurotropis leucopus* n. sp.

♀. Length .06 inch. Robust, coarsely scaly. Dark blue, excepting a slight metallic tinge on the thorax ; the apical tips of tibiæ and all tarsi white. Metathorax short, with delicate keels. Abdomen broadly oval, the petiole very short, second and third abdominal segments nearly equal, the following segments shorter. Wings hyaline ; veins pale yellowish, postmarginal vein wanting.

Hab.—Florida.

Entedon Dalman.

(7) *Entedon albitarsis* n. sp.

♂. ♀. Length .06 to .08 inch. Head, antennæ and thorax, blue-black, vertex of head and mesothorax, æneous, distinctly scaly. Abdomen of female pointed ovate, in male linear ; it, as well as the legs steel

blue; tips of tibiæ and tarsi yellowish-white. Wings hyaline; veins pale brown.

Hab.—Virginia.

(8) *Entedon arizonensis* n. sp.

♀. Length .10 inch. Head, antennæ and thorax, fiery cupreous. Head nearly smooth, vertex narrow; thorax and scutellum very coarsely scaly. Abdomen ovate, black, very highly polished, the second segment occupying nearly the whole surface. Legs blue-black, the anterior and middle pairs with metallic tingings, the posterior pair all cupreous. Wings hyaline; veins dark brown.

Hab.—Arizona.

(9) *Entedon columbiana* n. sp.

♀. Length .07 inch. This species is very close to *E. albitarsis*, and may prove to be nothing but a variety of that species. It differs, however, in being much more robust, more coarsely punctate and in having the trochanters, extreme tips of femora, all white, as well as the tarsi, characters that will readily separate the species.

Hab.—District of Columbia.

Asecodes Forster.

(10) *Asecodes albitarsis* n. sp.

♀. Length .08 inch. Blue-black, smooth, shining. Head and thorax with a decided brassy tinge. Scutellum smooth, metallic green. Antennæ (?) seven-jointed, scape blue, flagellum metallic green, pilose. Legs, excepting the three basal joints of tarsi which are white, all blue or black. Wings hyaline; veins brown, the postmarginal vein is slightly developed.

Hab.—(?)

Omphale Haliday.

(11) *Omphale bicinctus* n. sp.

♂. Length .09 inch. Stout, robust, cyaneous, delicately ripple marked. Head large, broader than the thorax. Eyes very large, brown. Antennæ inserted low down on the face; scape slender, yellow, excepting a dusky streak above near the apex; joints of flagellum black, with long hairs. Legs, excepting coxæ and femora which are black, all yellow. Abdomen pointed ovate, slightly longer than the thorax, the second

segment the longest, but extending hardly to half the length of the abdomen; sides with some long hairs. Wings hyaline, with two transverse brown bands across the disk; veins pale brownish, the postmarginal vein longer than the stigmal.

Hab.—Florida.

Closterocerus Westwood.

(12) *Closterocerus cinctipennis* n. sp.

♂. Length .04 inch. Head, pleura, sternum, metathorax and abdomen blue; collar, mesothorax and scutellum golden green, strongly punctate. Head emarginate in front and consequently very thin antero-posteriorly. Antennæ brown-black, hairy. Legs brown, trochanters, tips of tibiæ and tarsi pale or whitish. Wings hyaline, fringed with long hairs, forewings with a brown band extending across the stigmal region and another at the apical margin.

Hab.—U. S.

Sub-family TETRASTICHINÆ.

Anozus Forster.

(13) *Anozus siphonophoræ* n. sp.

♀. Length .04 inch. Black, smooth, shining, impunctured. Head transverse, very thin antero-posteriorly, front deeply emarginated. Antennæ black, (broken). Thorax transverse, collar not visible from above; mesothorax broader than long, parapsidal furrows, deep; scutellum large, smooth, convex, without grooves, broad at base, the scapulæ being very minute; metathorax short; pleura blue-black. Abdomen sessile ovate, yellowish at base. All coxæ black; trochanters, tips of femora and tibiæ, and all tarsi, yellowish. Wings hyaline; veins pale brown, the marginal vein is very thick and about as long as the submarginal, the stigmal and postmarginal veins not developed, wanting.

Described from one specimen reared from an Aphis, *siphonophera* sp.

Euderus Haliday.

(14) *Euderus columbiana* n. sp.

♀. Length .10 inch. Dull brown, or bronzy green, its whole surface including the abdomen strongly confluently punctate. Head transverse, not wider than the posterior part of mesothorax and with only a slight antennal groove in front. Antennæ about as long as the thorax,

eight jointed; scape slender, yellowish brown; flagellum dark brown, about twice as long as the scape, pubescent, the pedicel shorter than the first funicle joint, the latter joint the longest, about twice as long as wide, the following joints being not much longer than wide, sub-moniliform. Thorax: collar transverse, rounded before; mesothorax with parapsidal grooves well defined; scutellum longer than wide, without grooves, rounded behind, sides parallel. Abdomen conic ovate, cylindric, one-third longer than head and thorax together, the segments of nearly equal length. Legs dark brown, trochanters, knees, fore and middle tibiæ, and all the tarsi honey-yellow, hind tibiæ dusky in the middle. Wings hyaline, fringed with short ciliæ; the veins brown, the marginal is twice the length of the submarginal, the stigmal short, while the postmarginal is wanting.

Hab.—Florida and District of Columbia.

Hyperteles Forster.

(15) *Hyperteles hylotomæ* n. sp.

♀. Length .08 inch. Dark blue, with a faint metallic lustre on thorax. Antennæ eight-jointed, brown, pubescent, scape brownish-yellow, the joints of the flagellum are about twice as long as thick. Collar transverse, rounded before; mesothorax with a median groove; scutellum with two parallel grooves; metathorax with three keels. Abdomen oval-rotund. Legs pale brownish-yellow, excepting the femora, which are blue for two-thirds their length; tarsi pale. Wings hyaline, pubescent, veins pale brown, the marginal vein about twice the length of the submarginal, stigmal vein longer than usual, postmarginal wanting.

Hab.—Canada.

Described from three specimens sent to me by Mr. W. Hague Harrington, who reared them from the eggs of a saw-fly *Hylotoma* sp.

Aprostocetus Westwood.

(16) *Aprostocetus granulatus* n. sp.

♀. Length .07 inch. Black, with a coarse, scaly punctation. Antennæ, including scape, brown, pubescent. Thorax ovoid, the parapsides distinct, the collar very short, rounded before, the scutellum longer than wide with two grooves on its disk. The abdomen is pointed ovate, longer than head and thorax together, depressed above, rounded below, with an exserted ovipositor, nearly half its length. Legs dark honey-

yellow, femora and the tibiæ at base brownish. Wings hyaline, pubescent and ciliated, the pubescence brown, the venation as in *Tetrastichus*.

Hab.—Florida.

Described from one specimen.

(17) *Aprostocetus canadensis* n. sp.

♀. Length to tip of ovipositor .08 inch; ovipositor .02 inch. Dark blue, with a slight æneous tinge on the thorax. Head emarginated in front, and very thin antero-posteriorly. Eyes brown. Antennæ short, eight-jointed, brown, pilose. Collar short, transverse, rounded before; mesothorax with distinct, deep parapsidal grooves and a median groove. Abomen linear not quite twice as long as the thorax, concave above, keeled below, the ovipositor being not quite two-thirds as long as the abdomen. Legs honey-yellow, the femora, excepting at tips, blue; the tibiæ with a brown blotch in the middle, more distinct on the posterior pair; apical tarsal joints brownish. Wings hyaline, almost devoid of pubescence; the venation as in the genus *Tetrastichus*.

Hab.—Canada.

Described from two specimens sent me by Mr. W. Hague Harrington, who reared them from the thistle (?) cecidomyia, along with *Solenotus Fletcheri*, on which it may be a secondary parasite and from which it is with difficulty distinguished. *Solenotus*, however, has a larger collar and very broad, thick fore femora and tibiæ.

(18) *Aprostocetus americanus* n. sp.

♀. Length to tip of ovipositor .09 inch; length of ovipositor alone .03 inch. Smooth, shining black. Head emarginated in front and very thin antero-posteriorly. Antennæ eight-jointed, brown, the club wider than the funicle joints. Thorax: collar very short, transverse; parapsidal grooves deep, distinct and no median groove on the mesonotum. Scutellum convex, slightly longer than wide, with two parallel grooves on the disk. Abdomen sessile, long, linear, without the ovipositor about twice as long as the head and thorax together, very slightly widened just before apex and from thence acuminate and ending in a long ovipositor two-thirds its length, above depressed, below keeled with a few long hairs surrounding apex. Legs honey-yellow, the femora, excepting at tips, brown, the terminal joints of anterior and middle tarsi and the two

terminal joints of posterior tarsi, brown. Wings hyaline, with short ciliæ ; venation as in *Tetrastichus.*

Hab.—U. S.

Sub-family TRICHOGRAMMINÆ.

Trichogramma Westwood.

(19) *Trichogramma acuminatum* n. sp.

Female, length .03 ; male, .02 inch. Honey-yellow ; eyes purplish-brown ; legs pale or white. The abdomen in the female is acuminate-ovate, about twice as long as the head and thorax combined, with a lateral and a ventral row of five or six brown spots. In the male the abdomen is obtuse behind, not longer than the head and thorax combined. Antennæ pilose. The wings are strongly ciliate, the fore pair broadly rounded with a dusky blotch beneath the stigma, the hind pair rather narrowed and pointed at apex.

Described from two female and one male specimens, reared from a corn-leaf, and probably parasitic on the eggs of some leaf miner.

(20) *Trichogramma nigrum.*

Female. Length .02 inch. Robust, black, polished. Antennæ short, stout, brown. Legs entirely white. The scutellum is rather high testaceous, the extreme tip white. The abdomen is sessile ovate, not longer than the head and thorax, its dorsum somewhat flat. Wings hyaline, as in *T. acuminatum* without, however, the small blotch beneath the stigma ; veins brownish ; tegulæ white.

Described from two specimens.

(21) *Trichogramma ceresarum* n. sp.

Female. Length nearly .04 inch. Reddish-yellow, rather slender. Eyes brown. Abdomen and posterior femora fuscous, the fore and middle femora pale brown ; tibiæ and tarsi pale The thorax is triangular in front ; the abdomen not longer than the thorax but wider. Wings hyaline, as in *T. nigrum*, but with very strong violet reflections.

Described from two specimens reared from the eggs of the Membracid *Ceresa bubulus* Say.

PREPARATORY STAGES OF CATOCALA PALÆOGAMA, GUEN.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter .04 inch, low conoidal, a prominent bulging ridge round the base of one half of a hundredth of an inch on each side, so that inside of this the egg is .03 inch; striated with 38 prominent longitudinal striæ, of which 12 reach the small micropyle, shallow transverse striæ; apex small, not depressed. Color dull, pale, brownish olive. Duration of this period not known, but at least 194 days.

Young Larva.—Length .12 inch, of the usual Catocala shape, loopers on account of the first and second pairs of pro-legs being small; pale brownish yellow, joints 5 and 6 dark, somewhat blackish, joints 7 and 8 whitish, 9 and 10 blackish again; a faint fine red line on each side of body, very short hairs from the pelifirous spots. Duration of this period three days.

After 1st Moult.—Length .20 inch. Color reniform pale whitish, slightly brown tinted, head darker, a red line on each side with a broken line above it and another below it, of the same color, on the ventre a round red spot on the middle of each joint. Duration of this period four days.

After 2nd Moult.—Length .28 inch. On the sides are four rather broad, dark reddish purple stripes, alternating with pale greenish ones, these dark stripes approaching on joint 2 so that there is here only a narrow dorsal light line, the upper line indistinct; from joint 2 the dorsum widens out in pale greenish so that in the middle of the body this color extends to the region of the subdorsum, its outer part containing the upper part of the lateral stripe which is here broken and of a purplish green color. The dorsum from joint 5 to 10 has in its centre a series of very narrow elliptical pale purplish green spots extending from the middle of each joint to the middle of the next one back. Pilifirous spots small and black, head mottled with irregular longitudinal purplish black and pale greenish markings, the purple on joint 2 being of the same color but a little paler on its back part. Ventre with spots of the same dark color in the centres of the joints; feet pale. Toward the close of this period the larvæ turn darker, many of them being as dark on the whole of the dorsum as on the thoracic segments at the beginning of the period, this color purplish black, with a fine whitish dorsal line; all of them

darker than at the beginning of the period. Duration of this period six days.

After 3rd Moult.—Length .85 inch. Marked very much as in the preceding stage, stripes and mottlings purplish black, this color enough paler in the middle of the body to be purple, and jet black at the extremities, the two blending into each other and arranged in fine longitudinal stripes, each of which has a paler centre but which is not so pale as the alternating whitish stripe; the dorsum paler than the sides. Piliferous spots more prominent, black, the very short hairs black; head striped with broken white lines as before; ventral spots prominent only on the middle joints; thoracic feet pale. The lateral fringe begins to show. Duration of this period three days.

After 4th Moult.—Length 1.20 inches. Striped with black very much as before, but each stripe composed of three indistinct lines, making the body pale on joints 5 to 8 and the anterior part of joint 9 and the posterior part of joint 10, the rest of the joints darker; the light shade is lilac tinted with a yellow tinge between the joints from the middle of the body back; joints 2 and 13 so dark as to obliterate the stripes. Head striped as before, but the dark is orange shading into black towards the mouth; legs orange; pilifirous spots on the dorsum black with yellow at the base, the lateral ones yellow; the hairs on the dorsum black, on the sides and head pale yellowish; a black transverse patch on joint 9 between posterior pair of dorsal piliferous spots; eyes black; ventre pale yellow, a yellowish black spot in the middle of each joint; the substigmatal stripe not separable into lines but irregularly mottled. Duration of this period five days.

After 5th Moult.—Length 1 60 inches. Color pale purplish red mottled with black, in some more or less of a yellowish tint, rather distinctly arranged in five light and four dark stripes, the mottlings being thicker in the dark stripes, the pale stripes with darker centres, the outer edge of the pale being almost free from black but mottled in shades of red; the dorsal stripe with the dark in ellipses that have their broadest part between the joints; piliferous spots on joint 2 pale yellowish, almost white, tipped with black; those on joint 3 to 4 white; those on the dorsum of the other joints dark yellow, pale at base; those on the sides pale yellowish; the posterior pair of dorsals on joint 12 very much enlarged; all large and prominent, each with a short black hair; joint 9

has a dark patch on the posterior part of the dorsum. Head pale reddish, the same shade as the red ground color, marked with irregular longitudinal rows of white dots; feet pale red; ventre pale yellow with black centres to the joints, those at the anterior and posterior parts of the body small. At this time there is a distinct fringe of fleshy appendages on the sides.

Mature Larva.—Length 2.75 inches; cylindrical, tapering slightly to either extremity, with short lateral fringe. Marked as at the beginning of the period with seven longitudinal stripes from stigmata to stigmata, the lower dark one stigmatal, below this the space to the fringe the same color as the dorsal stripe, making the nine stripes mentioned before. The stripes are very nearly the same color, the only difference being that the dark ones have a little more of the black mottling than the pale ones; the stripes are divided by narrower stripes or broad lines of the ground color, which is dull, pale, smoky red. The thoracic joints are a little darker than the others. Piliferous spots pale nankeen, the dorsal tipped with orange; the space between the posterior dorsals on joint 9 black, only a little elevated; the posterior pair on joint 12 about three times as large as the others; each tipped with a very short black hair. Head, the ground color striped with reddish white that consists of transversely elongated dots; feet the ground color; fringe white; ventre pale yellow, a black patch on each joint. Duration of this period seven days.

Chrysalis.—Length 1.10 inches, depth .35 inch, width .40 inch; cylindrical, tapering from joint 5 back; tongue and wing cases extending back to the posterior part of joint 5, tongue case as far back as wing case; abdominal joints moderately punctured, anterior part of each a little corrugated; head moderately rounded. Color chestnut brown, covered with a white powder as is usual. Duration of this period from 30 to 32 days.

In pupating, the larva fastened leaves together with silk, slightly lining the interior, and into this thin lining the cremaster was fastened.

Food plant hickory.

The eggs from which the larvæ from which these notes were taken were found Oct. 5, 1886, in a crevice in a piece of hickory bark, there being fifty-eight of them in a mass, laid so that they overlapped each other, one edge of each being against the bark. I have since found the shells of other eggs in the crevices of hickory bark deposited in the

same way. The species of hickory upon which they were found was what is known as the Mockernut, or *Carya Tomentosa*.

The eggs hatched, or about one-fifth of them, April 17th, 1887, the rest coming out from day to day after this, and they emerged from the pupæ from June 14th to 16th, giving an egg period as above of at least 194 days, to which it is probable that at least two weeks more should be added; and from the time of hatching to the emergence of the imagines 58 days, of which one month is in the pupa state. I have no reason to think that this, or any other species we have here, is more than one brooded. I am also of the opinion that they pass through changes sooner in the hatching boxes than in their homes in the woods, as I never find this species on the trees before July; and the same may be said of some other species, though *C. Ilea* should probably be excepted.

After one had moulted, at the last moult, I saw it turn, after its usual period of rest, and eat the cast off skin.

THREE MOTHS NEW TO OUR FAUNA.

BY HY. EDWARDS.

In my article with the above heading, to which my friend Mr. J. B. Smith takes exception, I at once confess that an error occurs, and that the title should have been new to "our lists" and not to "our fauna." Mr. Smith wrote me a day or two after the publication of the paper, and I *at once* replied that I should have used the word "lists" in the place of "fauna." I am therefore somewhat surprised that in his printed remarks he did not allude to the correction I had personally made, but that he should take me to task *after* receiving my letter, and charge me with adding the species mentioned to our "fauna," when I had disclaimed the meaning he attributes to me. But though I am free to allow that the species I spoke of may not with propriety belong to the U. S. fauna, I am by no means willing to admit that they are on that account not deserving of a place in our Check List or Catalogue. This is, as I take it, not a philosophic account of species belonging to a certain faunal district, but merely the names of those species found to be inhabiting a geographical limit, and is intended chiefly for the purpose of enabling collectors and

students to classify their specimens, and in the case of a synonymical catalogue, of referring to the descriptions of species. At any rate, this is the view I take in giving *Pseudosph. Tetrio*, *Philamp. Typhon* and *Syntom. Epilaris* as being found within our limits, and I hold that they have as much right to a place among N. American, or rather United States species as many that have long been admitted. Of the first named, I have now seen five examples, four taken in Arizona, and one in N. W. Texas. Of these, one was quite fresh and in excellent condition, the others more or less broken and imperfect, though apparently more from careless handling than from either long flight or the age of the specimens. I cannot of course say positively that the species breeds in U. S. territory, but I have as much ground for believing that it *does*, as my friend Smith has for assuming that it *does not*. Then as to *P. Typhon*. The specimen to which I allude was taken by the late Mr. H. K. Morrison in the mountains of N. E. Arizona, as nearly as I can tell, about 200 miles from the boundary line. It is quite perfect, so much so that it may only have emerged from the pupa state within two days, and it seems to me hardly credible that this particular example should have flown such a great distance, and still retain in their purity all its delicate scales. *Syntomeida Epilaris* is from Florida, and I have very little doubt that it will one day be found there in comparative plenty. Indeed, I have good reason to believe that it was taken by Mr. Morrison a short time before his death, and it may possibly be among the Lepidoptera found by Mr. Schwartz during his visit to Key West some little time ago. If we are to discard these insects from our lists because our territory is not their original home, what will become of a large number of the species now included? One third at least of those from Florida, Texas, Arizona and S. California will have to be eliminated, for at least this proportion must be said to belong to a different fauna from the insects of Pennsylvania or Illinois. Mr. Smith calls attention to the fact that he has excluded *Diludia Brontes* from his monograph of the Sphingidæ. I still fail to see on what grounds. *D. Brontes* is found in Florida, and specimens taken by Dr. Wittfeld are in my collection and in that of Mr. Neumoegen. If these insects did not breed near Indian River, where did they come from? Surely Mr. Smith would hardly have us believe that they flew across the ocean from Cuba. I am no believer in the frequent long flight of any species of insects, though it is known that many species travel considerable distances, but I cannot bring myself to think that a specimen say of *D. Brontes* flies from its home in Cuba,

and that months or a year after two or three more do the same thing, and that these all find their way to Dr. Wittfeld's collecting box. As my friend W. J. Florence would say, this is T. T. (too thin). It seems more reasonable to believe, as I honestly think is the case with the species in dispute, that a few individuals have established themselves upon our limits, and that they are now gradually taking up new localities and spreading over a larger area. Mr. Smith alludes to *Erebus Odora*, and says that "because it has been found in Canada, it would be an absurdity to call it a Canadian insect." Now I think he is unfortunate in this statement. We do not yet know the food plant of the larva of this species, but because we are ignorant of that, it is no reason why it should not breed in Canada, and the evidence is in favor of its doing so. I have examined at least forty specimens of *E. Odora*, taken severally in New York, Georgia, Arizona, California, Vanc. Island, Canada, Michigan, Illinois and Ohio, some of them in absolutely perfect condition, and as fresh as bred specimens, and I am in my own mind quite sure that this species at least has taken up its abode with us, and is as much a resident of the U. S. as *Vanessa Antiopa* or *Pyrameis Cardui*. As to Mr. W. H. Edwards having "separately called attention to species occasionally found in but not really belonging to our fauna," I respectfully submit that this is a mistake. Mr. Edwards has done nothing of the kind. He has *discarded* from his Catalogue a number of "species for some time accredited to our fauna, but omitted for want of authentication," which is but saying in other words that had the statement of the capture of the species within our limits been given on undoubted authority, they would have found their place in his Catalogue. He has included indeed *Parnassius Eversmanni*, *Callidryas Philea*, *Diadema Misippus*, and others, which certainly are not parts of our fauna, but Mr. Edwards holds the same views as I do on the subject, and I claim no more for the three species I alluded to than is claimed for the diurnals I have just mentioned, and that is, that they have been found within our limits, that there is no evidence before us to show that they do not breed therein, and that therefore, when I change, as I am willing to do, the heading of my article to "our lists" in the place of "our fauna," the three species to which I called attention should be recorded in our catalogues.

THE ORIGIN OF ORNAMENTATION IN THE LEPIDOPTERA.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Elsewhere I have ventured to call attention to the interesting chapter in Mr. Scudder's book on Butterflies, in which the theory as to the primitive pattern of ornamentation is given. By this we are told that the complex patterns, the seemingly chiselled lines and the eye-like spots, arose from simple transverse shade bands running parallel to the outer margins of the wings themselves. Such bands we yet find on the wings of many Owlet Moths. In the Moths we might expect to find, still existing, a nearer approach to the primitive style of marking than in the higher Butterflies. Mr. Scudder's theory of the primitive pattern is quite independent of the theory as to the origin of the primitive transverse shade lines themselves. Referring to what I have said in my "Essay on the Noctuidæ" and in other places, about the pattern of one wing being reproduced in some species exactly, and in some whole families in the style of a rougher copy, upon the under-lying wing, I have employed the word "photographed" to express the effect produced. The primitive band may then be conceived to have been produced by an *outside* process, the effect of light and shade upon the surface of the wing itself. Its production may have been aided by the movement of the wings (expanding and shutting). The edges of the wings in many ways may be conceived to be first affected. That the primitive Lepidopteron was plain and sombre, we have reason to suppose, judging from what is known of now extinct types from which the whole Order may have been evolved. Under the murky skies of the Carboniferous the colors of the insects remained dull. Upon this plain wing, the first shade or marking may have arisen by a process comparable with photography, the action being produced by the same chemically acting ray of light. The atmospheric conditions then existing are factors in the problem. The shadow originally cast on the wing left a trace in process of time, a deeper tinting which became a permanent shade line or band. The evolution of this primitive shade band is the subject of Mr. Scudder's theory. The manner in which it may have arisen from a shadow has been long the subject of my own thoughts. I am aware that there is a learned opinion that the colors and patterns of insects are developed from the insects' insides, by a process the links in which I am unable to follow, and which it has not pleased the authors of this

inside theory to state. It seems more reasonable to conclude that the sun has been the original painter, still improving and beautifying his work. That the deviations from the original pattern and color have been seized upon by Natural Selection and that gradual changes have been fostered, may be conceived under the workings of general evolutionary law.

From a study of the subreniform spot in *Catocala*, I, many years ago, came to the conclusion that the spots in the *Noctuidæ* were modifications of the transverse lines, and this theory will be found stated in my writings. They may be fragments of original transverse lines, or, as the case seems to be with the subreniform spots, they may belong to existing transverse lines from which they have become disconnected. The median transverse shade is interesting, as it still simulates, by its cloudiness, the shade band of the secondaries and of the under surface of both wings in most *Noctuidæ nonfasciatæ* or *Noctuinæ*. The primitive transverse shade band will have been vague and cloudy, and all fine and cleanly cut markings will prove to be recent in comparison and to have proceeded from nebulous and undefined ornamentation.

The instances where the upper surface of the secondaries resemble the under surface of the primaries occur in the *Ceratocampinæ*, and also in the *Smerinthinæ*, among other groups. This fact struck me when I was studying the relationship between the Horned Spinners and the Eyed Hawk Moths. As a general rule, the cloudy bands on the under surface of the wings of the Noctuidæ or Owlet Moths, resemble those on the hind wings above. The under, or covered wing, bears a certain relationship to the upper, or covering wing, in coloring and ornamentation. We may conclude that it has remained longer plain and unicolorous, that its less exposure in certain groups of the Lepidoptera has allowed it to retain more of the primitive appearance. The Spanners, or *Geometridæ*, the Sparklers, or *Pyralidæ*, carry the under wings more exposed and the markings are continuous and similar on both wings above. This is the case with the lower or geometridous Noctuidæ, to a considerable extent. The pattern of the wings seems to follow the exposure, as I have elsewhere pointed out. The conditions of the caterpillar stages are widely different from the environment of the perfect insect, and I have long ago pointed out that each stage varies independently and unequally, as in the case of the representative species of *Apatela*, etc, (see my paper in Annals N. Y. Lyceum, N. H.) I have also elsewhere drawn attention to

the law of variation in representative species in the Owlet Moths. This variation is first observed on the upper surface of the fore wings, then of hind wings, while the whole under surface preserves its similarity longest. The uniformity of the under surface in the Noctuidæ seems to be correlated with the habits of the insects themselves, to depend, in fact, upon the conditions of its exposure to the light. I am not here arguing that color in the wings is now dependent upon existing conditions of light. I merely point out that variation both in color and marking proceeds apparently more noticeably upon the more exposed surfaces of the insect in the Noctuidæ, from a comparison of related species inhabiting different parts of the world. In the history of the Lepidoptera former geological conditions have played a part in the evolution of species together with the whole environment. In this paper I merely show the probability that the first transverse markings were the effect of light, and that the more exposed surfaces show most variation in representative species. From my scattered writings I have in part brought these brief notices on this point here together, so that the student may be spared that trouble, and in the hope that the investigation may be carried further.

In the investigation of this subject we must keep the phenomena of color and pattern separate. The test of our theories must lie in the observation of existing variations. In this direction the observations of Mr. Edwards on the influence of cold in the pupa state upon the colors of the imago, are of the utmost value. The class of facts bearing upon the phylogeny of the species must be kept separate from those bearing upon individual variation. But it must be remembered that varieties are in the same sense evanescent species, that species are permanent varieties. The crucial test of our modern idea of species lies in the demonstration of the fact that, in the whole life history, the cycle of reproduction is *now* distinct. To the establishing of this fact repeated observations are often necessary. The whole conditions under which the form is produced must be understood. This is a great field of work, and single instances, however carefully recorded, of breeding from the larva, only partially illustrate the subject. The value of specific determinations from collections of perfect insects depends on the tact and experience of the naturalist and are to this extent tentative. Only where the full round of insect life is known can our determinations be absolutely reliable. The vista of entomological labor is widening as we proceed, so that it is trite to say that the subject

is inexhaustible. The most attractive side of the study consists in the curious habits and relationships of the different forms, and here is where the talent of the observer is to be tested. The assorting of collections of specimens is a matter of subordinate tact.

CEYLON BUTTERFLIES.

The Lepidoptera of Ceylon, by F. Moore, F. Z. S., Vol. I., (published under the special patronage of the Government of Ceylon) London, L. Reeve & Co., 1880-81. 4°.

The butterflies of the East India region appear to be now in a fair way of receiving their due share of attention. We have already called attention to Distant's invaluable work on the Malayan butterflies, and to the handbook to the butterflies of India and Burmah, by Marshall and De Nicéville. On many accounts neither of these is so important as the earlier work on the Lepidoptera of Ceylon by Frederick Moore, which we desire to introduce to the readers of the CANADIAN ENTOMOLOGIST, principally on account of the very considerable accession to our knowledge of the earlier stages of eastern butterflies which is here given in the plates, and also to draw attention to the notes on the natural history of the insects given by Dr. Thwaites, which are embodied in the text. The work as a whole consists of three volumes ; but we speak here of the butterflies only, which are comprised in the first volume, published in 1880-81. It is a large quarto, with 71 excellent colored plates, in which the early stages are in very many instances figured side by side with the butterflies. Notwithstanding that it is published under the special patronage of the Government of Ceylon, the work is a costly one, and to one residing in the United States an embargo is laid upon its purchase by the fact that the duties upon such a work are so high. This single volume cost me $15 for duties and transportation alone. Thus is science encouraged with us !

We are here introduced to a new set of illustrations of the early stages of butterflies, many of which are of extreme interest, and these in every family of butterflies. It is the most important and considerable contribution to our knowledge since Horsfield's memorable volume. It is a pity, however, that in many instances no reference is made in the text, either in Dr. Thwaites' notes, or Mr. Moore's descriptive portion, as to the meaning of certain figures which differ strikingly from those of their allies.

Thus the pupa of a species of Cirrochroa is represented as hanging by its hinder end, as in all Nymphalidæ, but bent so at the end of the abdomen as to lie parallel to the horizontal branch from which it is suspended, much in the way that we find it in our own species of Chlorippe; but there is no appearence in the figure and no mention in the text of any greatly elongated cremaster with its row of hooklets down the side, which in Chlorippe stiffens the pupa into what would seem to be an unnatural position. We have some interesting additions to our scanty knowledge of the early stages of the Lemoniinæ and an unusual wealth of larvæ and pupæ of Lycaeninæ. Here again is a figure of a species of Spalgis hanging by its tail without the median girt, which is wholly anomalous in this subfamily, but, as there is no explanation of the matter in the text, it is to be presumed that it is not meant to represent the insect in its natural position, the more so as the same is the case in a species of Appias, one of the Pierinæ, represented in two figures as hanging by its tail only, while the whole structure of the chrysalis indicates that it must have had a median girt. Very interesting are the figures of the early stages of the Papilioninæ, which add very considerably to our knowledge, including as they do some figures of the younger stages of the larva—presumably younger from their appendages, though here again no mention whatever is made of the fact in the text. We call attention also to the interesting figure of Gangara, a hesperian living open and unconcealed, as I am informed by Mr. De Nicéville, and which bears long waxy filaments apparently not proper appendages, but as long as the width of the body itself, rendering it an exceedingly conspicuous object.

In the arrangement of families, Mr. Moore follows the rapidly growing company of the best instructed entomologists in beginning the series with the Nymphalidæ and placing the Papilionidæ just before the Hesperidæ. He separates the Lemoniinæ from the Lycaeninæ as a distinct family, and places the Libytheinæ with the Lemoniinæ as was done by Bates; but he brings the Pierinæ and the Papilioninæ under one family heading. It has naturally pleased the present writer to see that Mr. Moore has had the courage of his convictions sufficiently to subdivide the old and bulky group so long holding rank as a homogeneous whole, the so-called genus Papilio, into a number of genera, including among the seventeen species which he catalogues no less than ten genera, following thus precisely the line which Hübner long ago undertook to establish, and which I adopted in 1872.

SAMUEL H. SCUDDER.

EARLY STAGES OF ARZAMA OBLIQUATA, G. AND R.

BY H. H. BREHME, NEWARK, N. J.

EGG.—Fusiform, thick in the middle and tapering to a small rounded summit. marked by about sixteen longitudinal ribs, which are low, narrow, flat and crossed by a few fine ridges. Color yellow-brown. Duration about fifteen days.

YOUNG LARVA.—About .8 inch in length, cylindrical, slender; shape like the other Arzamas. Color pale green, with a few long hairs proceeding backwards. Duration eighteen to twenty days.

MATURE LARVA.—When fully grown the larvæ are 1½ inch in length, some as much as two inches long. They are very slender; head thick; color more gray; body smooth, with no hairs.

PUPA.—Length .75 inch; breadth across mesonotum .16 inch; across abdomen .16 inch; greatest depth .22 inches. Shape like the other Arzamas. Color dark brown. Duration sixteen days.

The eggs from which these observations were made were obtained on the 26th of October, 1886, by confining a dilapidated female caught flying about the food-plant—the Cat-tail reed. The female generally lays her eggs in the middle of the reed, between the long leaves. They began to hatch on the 10th of November, thus giving a period of about 15 days. They began to go into pupæ on the 20th April, 1887, making the whole larval period 161 days; adding to this the pupal period of 16 days, makes a total of 190 days from the egg to the imago.

The food-plant—the Cat-tail reed—grows in the meadows. As soon as the larva is hatched, it bores at once into the reed and feeds from the top downwards, continuing to feed throughout the winter, until the whole of the reed is eaten out; it then returns to the top, and forms its pupa there. The larva is very hard to rear, as it feeds during the winter, and the reed must be kept as wet as possible. I have succeeded by keeping the reeds in a pail of water.

The moth generally begins to fly between four and five o'clock in the afternoon, and ceases between seven and eight o'clock. Its flight is very slow. It is described and figured by Grote and Robinson, Trans. Am. Ent. Soc., vol. I., page 339.

CORRESPONDENCE.

ON INSECTS FEIGNING DEATH.

Dear Sir : I notice in Dr. Hamilton's paper, page 6, the remark that a statement made by me in your pages, namely, "that insects can have no knowledge of death," as such of course and purposely feigning it, is "unsupported" and "dogmatic." I wish to correct these two adjectives, otherwise, as a matter of opinion, I have no further interest with the subject. I cited in my paper the reason for my belief that insects merely kept still and did not move on the approach of danger. I showed that hard bodied insects, as beetles, suffered themselves to drop, while soft bodied caterpillars, equally assuming attitudes of repose and quiet, assisted by their colors and mimicry, clung tenaciously. There is no doubt in my mind that the "keeping still" is the main point, and that the insects have not sufficient mental powers to feign death. Whether insects can have any knowledge of death, as such, may be a matter of opinion, I should as soon credit them with a knowledge of history. Beetles allow themselves to fall by folding in the legs, knowing, from acquired or hereditary experience, that a fall will not hurt them, while in the grass where they tumble they have a place of concealment where they can stop "feigning" and scamper away. While I do not believe that insects can reach the "feigning" process, I know that Dr. Hamilton can, when he says of my paper, which we have all at least glanced over in the pages of the CANADIAN ENTOMOLOGIST, that he "lately saw it in print somewhere." Such carelessness is probably feigned, and whether it is protective may be doubted. It is, however, the privilege of man to keep still, without the danger of being credited with feigning death, a privilege it seems denied to insects. It is well so, since a silent man might run the risk of being buried on suspicion. A. R. GROTE.

NOTES ON COLEOPTERA.

Dear Sir : In my paper in the April No. of the ENTOMOLOGIST, page 66, last line, *Apion herculanum* is printed in error *herculaneum*. On same page I wrote "*prolongata* [Dicerca] breeds so far as known in conifers." This statement admits of a doubt, when the proof is sifted thoroughly. Mr. F. C. Bowditch writes that he collected it on the Colorado mountains on aspen and willow, but never on conifers. It is probably polyphagous, like some other species of this family.

JOHN HAMILTON.

The Canadian Entomologist.

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THE HESSIAN FLY AN IMPORTED INSECT.

BY DR. C. V. RILEY, WASHINGTON, D. C.

As the readers of the CANADIAN ENTOMOLOGIST are aware Dr. H. A. Hagen has argued at length to the effect that the Hessian Fly was, *first*, not imported by the Hessian troops; *secondly*, that it was not imported from Europe at all, and that it is an indigenous North American insect. In the Third Report of the U. S. Entomological Commission, Dr. Packard has an extended article upon the Hessian Fly, and while he alone is responsible for the general position there taken on this subject, we discussed the matter together, and the views there presented are substantially those which I held at the time, as it was Dr. Packard's desire to arrive at an impartial judgement. The subsequent communication of Dr. Hagen in the CANADIAN ENTOMOLOGIST for May, 1885, seemed, however, positively to set at rest the question of the introduction of the insect by the Hessian troops, as well as of its occurrence in this country prior to the revolution; because the correspondence which he there published from Mr. H. Phillips, jr., seemed to admit of no further doubt that the first question was settled in the negative, and the second in the affirmative. While in Europe last autumn, I found a great deal of interest manifested in the subject of the Hessian Fly in England, on account of its recent introduction there, and, being called upon, I made some statements at one of the meetings of the London Entomological Society, which will be found reported in the Transactions of the Society for October 5, 1887. I take the liberty of quoting therefrom the following passages as indicating my position in the matter:

"Prof. Riley said it would extend his observations beyond reasonable limits, to enter into the details on which he based his own conviction, which had been substantially expressed in the full paper by Packard, in the 'Third Report of the United States Entomological Commission (1883).' His opinion was that while we might drop the Hessian theory—since Mr. Henry Phillips, jr., as quoted by Hagen (1885), finds mention of the 'Hessian Fly,' in the unpublished minutes of the American Philosophical Society for 1768 (a rather astonishing fact, as it antedates the landing of the Hessians!),—and

concede that the insect was introduced some time prior to the revolution; yet that its introduction *about* that time must be accepted, because Hagen's arguments to the contrary were not supported by [sufficient] evidence."

"Prof. Riley further remarked that he had referred to these conflicting views of leading writers as to the original source and time of introduction of the insect into America, not so much to foreshadow the future conflict of opinion on similar points in England, as to bring out this important fact as a warning to hasty generalisers, viz., that the arguments of Wagner, Hagen, etc., against its introduction into America, were inherently weak from the biologic side. They are based on the average or normal period of summer development of about seven weeks from egg to adult, and *ignore the important bearing of exceptional retardation in development whereby the puparia of one summer remain latent and only give forth the flies in the spring or early summer of the ensuing year.* This fact, recognized by Harris (1852), Prof. Riley said he had evidence of in America in garnered straw, and it was proved by Wagner himself to have occurred in Germany in field stubble. It was more apt to occur, however, in straw kept dry and packed than in stubble or exposed straw, and is in keeping with many other similar cases of retarded development in insects, some remarkable instances of which he called attention to before the American Association for the Advancement of Science in 1881. It destroyed Hagen's main argument, rendered the introduction of the species possible at almost any season, and made its introduction to America by the Hessians, who left Portsmouth, April 7th, and landed June 3rd, 1777, on Staten Island, quite probable and plausible from biologic grounds."

For the purpose of the present communication, it is not necessary to go into the other arguments which Hagen has brought forward to relieve the Hessians of whatever onus attaches to their accidental introduction of this insect: the more important are, (1) that there was no Hessian Fly in Germany at the time, and (2) that the Hessian troops did not carry straw from regions in which it did occur. At this late day it would be folly to attach too much importance to these negative deductions, where there are so many possibilities of their both being erroneous in fact. The evidence as to the introduction and spread of the insect in this country is of a so much more clear and positive nature that it off-sets such negative deductions. With the exception of Mr. Phillips's positive statements, there is only one other recorded statement that would seem to indicate that the Hessian Fly was known in the United States prior to the landing of Hessian troops. This is a statement quoted by Fitch, of Judge Hicock, of Lansingburg, N. Y., who says (Memoirs of Bd., of Agr., 11, p. 169) that a farmer named Jas. Brookins had informed him (Hicock), that upon his first hearing of the alarm upon Long Island, in the year 1786, he (Brookins) detected the same insect in the wheat growing on his farm in Lansingburg. Fitch remarks in parenthesis, "doubtless 1776

is intended here," evidently on the assumption that Brookins's first hearing of the alarm on Long Island was coincident with the first alarm—an assumption by no means necessary, and one which only complicates the matter. If we grant Mr Brookins's statement to be reliable, there would be nothing remarkable in it as an observation of 1786. But whether for 1776 or 1786 it were folly to overthrow prevailing record and belief by one such unverified statement as this, where the chances are so great of inaccuracy from mere hearsay, and Fitch was justified in stating the strong probability that it was some other insect which was found by Col. Brookins.

Mr. Phillips's statements, as the readers of the CANADIAN ENTOMOLOGIST are aware, are of a very different character. In response to Hagen's inquiries, made to Prof. J. P. Lesley, Mr. Phillips wrote as follows :

"At the request of Prof. Lesley, I have examined our old minutes in reference to the Hessian Fly, and append on next page the results of my search. I know *positively* that before the revolution our newspapers were full of communications in reference to the Hessian Fly *eo nomine*. I cannot call to mind any one paper, but I remember perfectly frequently seeing these articles when reading for other purposes. I cannot find that the committee ever reported."

The following are the extracts from the minutes as furnished by Mr. Phillips :

1768, May 18. Com. on Husbandry to consider whether any method can be fallen upon for preventing the damage done to wheat by the Hessian Fly. [N. B.—Mr. DuHamel has written on the subject.]

1768, June 21. Papers on the Hessian Fly read by Dr. Bond, ordered to be published. See No. 4, original papers.

1768, Oct. 18. Col. Landon Carter, Sabine Hill, Va., observations on the Fly Weevil destructive to wheat ; ordered to be published. [Is published in Vol. 1. of the Transactions of the Society. Cf. Harris, Injur. Ins., pp. 502. Dr. H. A. H.]

And upon being again questioned by Dr. Hagen as to the possibility of error Mr. Phillips writes :

"1. 1768 is not an error. It occurs in the proper place in the old M.S. Vol., and there can be *no doubt* about the fact. *Similiter* the words *Hessian Fly*.

"The term came in use in Pennsylvania from the early German immigrants long before the revolution. I am *sure* the term occurs in our Pennsylvania gazettes long prior to that period.

"2. Cannot say if that paper (of Bond) was ever published. Possibly in some gazette *pro bono publico*. There is no clerical error as to the date and name."

Since this correspondence was published by Dr. Hagen in the CANADIAN ENTOMOLOGIST, the early minutes of the American Philosophical

Society have been published, and the published volume confirms the above statements of Mr. Phillips, as in the minutes for May 18, and June 21, 1768, the term Hessian Fly was printed.

The evidence against the introduction of the Hessian Fly, and even its introduction by Hessians is so easily set aside, and so weak as compared with the positive evidence of such introduction, that I have long wondered at the records of these meetings, and thought that there must be some error. Only recently, however, did I have the opportunity of personally referring to and examining these early minutes in the original. I felt an interest in doing so, because I thought it barely possible to show that they were transcripts from earlier rough minutes, and made subsequent to the revolution, when the term Hessian Fly, then familiar, was inadvertently added by the transcriber. I was therefore much amazed to find that there is really no mention of the Hessian Fly in these old minutes, until the year 1791. I take the liberty of reproducing *verbatim et literatim* the records as they really occur of the three meetings in 1768, quoted by Mr. Phillips in Dr. Hagen's communication :

May 18th, 1768.—"It was recommended to the Committee of Husbandry, &c., to meet on Tuesday, 31st of this month, at the college to consider whether any method can be fallen on for preventing the damage done to wheat by what is called the fly. N.B. Monsieur du Hamel has written on this subject."

June 21st, 1768.—"The Committee for Husbandry report that they had considered ye affair of destroying the Fly in wheat, and that Dr. Bond had laid before them a paper containing many useful observations on that subject, which Dr. Bond was requested to read before ye Society. The Society having heard and approved of ye paper request him to prepare it for ye Press, that it may be communicated to ye public without loss of time."

Nov. 15, 1768.—"Colonel Lee transmitted to the Society the ingenious and accurate observation of Colonel Landon Carter, of Sabine-Hall, in Virginia, concerning the *fly-weavil* that destroys the *wheat*. The Society acknowledge themselves under great obligations to Col. Carter for communication of the conclusions he has formed (on long experience) concerning that insect's propagation and progress, and the methods to be used to prevent the destruction of the wheat by it, and order it to be printed for the public benefit."

It will be seen that in all three "the fly," "the fly in wheat" and "the fly-weavil" are the terms used, and it is susceptible of positive proof that all these popular terms applied then, as they sometimes do yet, to entirely different insects, viz., the grain-weavils, *Sitophilus granaria* and *S. oryzæ*, and the Angoumois grain-moth, *Gelechia cerealella*. Now the minutes, as published, are avowedly abstracted from the original

minutes by Prof. Lesley, and not full, while the copies of Mr. Phillips neither agree with the originals nor with the published abstracts, while in one case, as may be seen, he has changed Nov. 15, to Oct. 18. I can readily understand how Prof. Lesley inadvertently used the term Hessian Fly in abstracting from the minutes, if indeed he did so; but it is more difficult to explain Mr. Phillips's positive statement after Dr. Hagen's specific questioning. Mr. Phillips was unable to explain to me how he came to make the error, and just as unable to give me any definite reference that will justify his very positive recollections of having seen the term "Hessian Fly" *eo nomine* in pre-revolutionary literature. When the statement of ocular evidence turns out to be so incorrect we cannot attach any importance to his memory, even where so confidently asserted.

With the final disposition of this strongest blow to the general belief that has prevailed for a century among both husbandmen and entomologists, I feel that we must not only accept the general verdict and tradition as correct that the insect was introduced about the time of the revolution, but that there is no very convincing or valid reason for rejecting the other common belief that it was imported by the Hessian troops. The recorded history of the period does not necessarily include all possible, or even probable facts in relation to the limits of distribution of the insect in Europe, or of the sources from which infested straw may have been derived by the Hessians.

In what I have said above I have spoken of the *general* belief and arguments in favor of the introduction of the Hessian Fly to this country, because I am quite aware that others besides Dr. Hagen have argued for its indigenous nature; but none of them have perused the question with such single perseverance, and such bibliographical zeal and erudition. He, in fact, deserves our thanks for having brought together so large a body of bibliographical data, because I think it has been the means of confirming not his own conclusions, but the opinion arrived at by Fitch and others.

While in London last autumn I took the trouble to look up and read over the voluminous letters and reports, of which Dr. Hagen has published a list, contained in "the proceedings of His Majesty's most Honorable Council, and information respecting an insect supposed to infest the wheat in the Territories of America." I was thus enabled to verify the accuracy of the list furnished Dr. Hagen by Prof. Nichols. I was fortunate enough to

secure a copy of the "Annals of Agriculture," published by Arthur Young, Vol. 11, 1789, pages 406 to 613, of which are devoted to these papers. The title in this volume differs only from that given by Dr. Hagen, in having the word "Privy" before "Council," and the contents of the volume from the table of titles given by Dr. Hagen, only in that his Nos. three and seven "Orders of the Council" are omitted in the Annals. The original paper is a quarto volume, and fills in the octavo Annals nearly 208 pages, which will account for the discrepancy in the space occupied by each article, the articles in the Annals not being numbered, I refer to these old papers because they are most interesting as exemplifying the fact, that the late confounding of such terms as "Fly-weavil" for "Hessian Fly" in the minutes of the American Philosophical Society, which has made such a difference in the historic facts, had its counterpart at that time. The more important papers consist of a letter (1788) by P. Bond, Consul at Philadelphia, to the Right Honorable Marquis of Carmarthen, about the injury of the "Hessian Fly" in the Middle States, and supposing that the eggs are laid in the grain, as "seed wheat steeped in a preparation of elder juice effectually secures a crop." Bond probably referred to the true Hessian Fly, but his letter is followed by one from Sir Jos. Banks, President of the Royal Society, to the Marquis of Carmarthen, in which Banks calls the insect "the Flying Weavil," describes the adult as a minute moth, likens it to the clothes moth, states how the eggs are laid upon the grains of wheat and produce a diminutive caterpillar; in fact refers to the Angoumois grain-moth. There is a large subsequent correspondence, and finally Banks recogizes his first mistake and collects a good deal of information about both *Gelechia cerealella* and the true Hessian Fly, the latter derived from Dr. Mitchell.

Pages 465 and 471 are occupied by an excellent article by Col. Geo. Morgan, of New Jersey, to Sir John Temple, Consul General for Great Britain at New York, which gives a good account of the spread of the Hessian Fly and its origin, states that the name was given by him and a friend early after its first appearance on Long Island, and then treats of the "Virginia Wheat-fly," and also of the "Chintz Bug-fly." It is worthy of note that these papers are preceded in Young's Annals by an anonymous article entitled, "On the Hessian Fly, whose depredations have been very mischevious in America," in which the author recognizes and describes the work of *C. destructor*, describes its annual spread from the

points of introduction, and remarks that it must not be confounded with the "Virginia Wheat-fly" *(cerealella)*. The reading of all these papers simply confirms the conclusions which I have expressed in this communication.

Washington, D. C., May 22nd, 1888.

P. S.—In the above communication I have stated merely the facts of the case without any attempt at explaining away Mr. Phillips's misleading statements. The receipt, since the article was written, of the latest part (No. 127) of the Proceedings of the American Philosophical Society, bringing them down to the meeting of May 4th last, induces me to add this postscriptum.

I spent the evening of May 3rd very delightfully with Dr. G. H. Horn, who, as one of the secretaries of the American Philosophical Society, was interested in my intended investigation of the old minutes; in fact Dr. Horn informed me that Mr. Phillips, knowing that he (Horn) was about to visit Dr. Hagen on his way to Europe, had but a short time before charged him to tell Dr. Hagen, that the latter might feel quite certain of the accuracy of his (Phillips's) statements. I have already indicated my surprise at finding them unverified, and shown how Mr. Phillips was unable to give me any explanation of his mistake.

There was to be an exceptionally interesting meeting of the Society that evening, and I purposely remained in Philadelphia to attend it, and took occasion to call attention to the error in the old minutes above set forth. Mr. Phillips, following my remarks, threw all the blame for the published error on Prof. Lesley who was absent in Europe at the time; and, having in mind his (Phillips's) communications to Hagen, this conduct struck me as not very magnanimous. I deemed the correction of this error of sufficient importance to go on record, and handed to the Secretary for incorporation in the minutes a brief abstract of my remarks. Judge of my surprise therefore to find the whole matter passed by in the published minutes of that meeting of May 4th last, by the statement of the Secretary that "Prof. C. V. Riley referred to a possible error of transcription in the Volume of Early Proceedings (No. 119), on pages 14 and 15, as to the word Hessian Fly" (!!) Mr. Phillips's conduct in this particular is as remarkable as his correspondence with Dr. Hagen, and I call attention to it that it may no longer obscure the facts of history.

ON DIADEMA MISIPPUS, LINN, IN FLORIDA.

BY W. H. EDWARDS, COALBURGH, W. VA.

About the middle of last November Miss Annie M. Wittfeld, whose untimely death I have spoken of elsewhere, wrote me that she had taken a butterfly of a species which she had never seen before, while it was laying eggs on purslane. She confined the butterfly with the plant and obtained 74 eggs. It was like a Danais, she said, but the caterpillars were like a Vanessan. I wrote her it probably was *Misippus*, a single male of which Dr. Wittfeld had taken several years before. The female of this species is entirely unlike the male in colour and markings, and really imitates a pale Danais. Meanwhile eggs and larvæ at every moult were put in alcohol for me, and after my letter was received Miss Wittfeld inflated two mature larvæ, and with all these stages sent me living papæ, so that I shall be able to illustrate the history of this curious butterfly. This was the last thing Miss Wittfeld did for me, and is an example of the intelligent and painstaking work she was accustomed to.

Misippus is a common species in south-eastern Asia, in Australia, Africa, in parts of South America, and is found in some of the West India Islands. Drury figured the male, and gave New York as one of the localities, but, except these few Florida examples, I know nothing of the occurrence of the species within the United States. As the food plant is everywhere one of the commonest of weeds, it is not improbable that from Florida *Misippus* may spread northward.

In Papilio 1, p. 30, I mentioned the capture of the male spoken of under the name *D. Bolina*, Linn. *Bolina* is an allied but distinct species. The one taken in Florida is MISIPPUS.

SOME NEW NOCTUIDÆ.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Agrotis agilis, n. s.

Two males in good condition received from Mr. James Fletcher, from Vancouver, belong to a decidely different species from my *semiclarata*, Essay, Plate 1, Fig 9, though allied, as also to Californian *gravis*, and our Eastern *venerabilis*. Antennæ brush-like. Gray, with a brown tinge. Lines obliterate. Fore wings yellowish gray fuscous, brownish, with a red

tinge along costa, this color obtaining before the s. t. line before apices. A distinct velvety black basal streak, absorbing the claviform spot and extending below median vein from base to the faint yellowish brown median shade line. Cell filled in with velvety black on which the complete, rounded, orbicular rests, a little pointed outwardly. Reniform moderate, subequal, transverse, of the normal shape, surrounded almost completely by the cellular black filling. Some black scales along costa marking the inception of the transverse lines, which are here filled in with white, under the glass. The red brown shade obtaining before apices, shows three pale ante-apical costal dots. The s. t. line is marked by cuneiform, dark, subequal shades and followed by a white shade more determinate at costa. Terminal space narrow, darker than the wing. Hind wings rather uniformly pale fuscous; beneath with an outer shade line and costal border, paler than fore wings beneath, with a thick cellular spot and somewhat whitish at base and inferiorly. Fore wings smoky fuscous, with faint outer transverse shades. On fore wings above, the pale shade is more or less noticeable outside s. t. line at the apex of the wing. Head and collar ochre brown. The collar shows a double black superior line enclosing a reddish shade; the upper black line edged outwardly with white scales. Tegulae whitish, pale; abdomen fuscous; anal hairs ochery. *Expanse* 30–32 mil.

Agrotis hospitalis Gr., Can. Ent. xiv., 184.

This species is allied to *Baja* by the black mark, inaugurating s. t. line, but otherwise it is quite close to *Perconflua*. I think that I am hasty in considering it a variety of the latter species, but the pattern is much the same, although the lines are marked in black in *Hospitalis*, and the color of primaries is a more uniform and darker brown, approaching *Baja*. At any rate this species must be catalogued with *Conflua*, *Perconflua* and *Hilliana*. In Papilio iii., 29, my late lamented correspondent, Mr. W. W. Hill, records the capture of two specimens of *Hospitalis* in the Adirondack region in July. On a very close comparison with *Perconflua*, taken by the same Entomologist at Centre, N. Y., in August, the shape of the t. p. line is seen to differ from that species. In *Hospitalis* it slopes away downwardly and outwardly from costa much more obliquely; it is less upright, more outwardly exserted or bent. The species are alike in size, in color of hind wings and in the paler front and palpal tips, contrasting with the

darker sides of the face and palpi. There will be nothing gained in throwing these forms together, and they must be bred to decide. The character of the t. p. line escaped me until recently, and speaks for the ultimate distinctness of *Hospitalis*.

Xylomiges Fletcheri, n. s.

The species sent me from Vancouver, by my kind correspondent Mr. James Fletcher, is apparently allied to the forms described by myself from California, under *Xylomiges*, such as *hiemalis* and *curialis;* a specimen of *X. crucialis* Harv. is also before me from Vancouver. *Fletcheri* differs by the more compact shape, the pale fuscous hind wings with darker stained veins. The eyes are hairy, the body untufted, and the color is a stone gray overlaid with whitish, so that the moth approaches *Anytus sculptus* in color. The costa is straight, the wings rather short and full outwardly, with pronounced apices, reminding one a little of *Cloantha*. To the eye the wings appear of a rather light stone gray, but under the glass the whole base of the wing is seen to be overlaid by white scales, as also the coalesced large stigmata, which are outlined in black, completely fused inferiorly, forming an irregular V; the inner limb of this, the obicular is outwardly oblique; the outer, the reniform, is upright, sinuate on its outer edge. The white scales appear again over the terminal portion of the wing. The lines are black, fragmentary, marked by different shades on costa. A fine black basal ray. The median lines are waved and inferiorly approach each other, narrowing greatly the median space below the cell; the concolorous claviform spot, also outlined by black scales, joins the median lines on submedian fold, although moderate in size. The subterminal line is fragmentary, black, appearing between the veins. Head and thorax fuscous gray, a little darker than fore wings, unlined; tegulæ shaded with whitish; at the sides with a black edging. Abdomen dusky gray. Beneath the primaries are clouded fuscous; the secondaries paler than above with a neat dot and an extra mesial line accentuated on the veins. Antennæ of the male simple; smaller and shorter-winged than the other species described by me. *Expanse* 30 mil.

Orthosia hamifera n. sp.

This species has been sent me from California, by my kind friend Mr. James Behrens. It is allied to *purpurea*, but larger. The male antennæ are brush-like, female simple. The fore wings are pointed at apices;

the exterior margin somewhat sickle-shaped; the eyes are naked; the tibiæ unarmed. Head, thorax and fore wings brownish wine-red; the thoracic hairs show a tipping of white scales under the glass. All the markings obliterate, so that the insect in color and appearance reminds one of *Perigrapha transparens.* The markings are indicated by blackish scales. Reniform marked by an upper and lower blackish clouding, moderate, upright, finely ringed with pale. Orbicular more faintly marked, a little oblique, approximate, also finely ringed with pale. The median shade crosses the wing. Lines not discernible; under the glass the s. t. line is seen to be marked by double black points on the veins. Fringes more clearly red on both wings; secondaries without marks, somewhat evenly fuscous; beneath paler, with traces of the reniform on primaries; secondaries with a dot. This is larger than *crispa;* varying in depth of red, the female the darker. Three specimens. The insect looks like *Gortyna nebris* a little, except in its red color. *Expanse* 35 mil.

DESCRIPTION OF THE PREPARATORY STAGES OF CHIONOBAS JUTTA.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

Eggs laid June 17th., scattered, hatched July 1st.

Egg.—Creamy white: one-twenty-fourth of an inch in diameter; shaped like a nutmeg-melon; marked longitudinally with zig-zag ridges; attached by short foot-stalk.

Newly Hatched Larva.—One-eighth of an inch long. Head large in proportion to body, honey-yellow, granulated. Body attenuated and ending in two pointed prolongations; pale amber, set with brown tubercles bearing light spines. Dorsal and side lines darker amber. Spiracles dark brown. Head and fore legs bearing a few bristles. The insect feeds with its head downwards on the edge of the leaf. Its food plant is the sedge, *Carex oligosperma.*

The first moult occurred July 6th. The skin was ruptured under the head.

Larva After First Moult.—Length one-fourth of an inch. Colour a delicate shade of pea-green; dorsal, sub-dorsal and side lines a pale warm

brown; spiracles black. A few small black warts on the body. Head honey-yellow.

Moulted July 30th.

Larva After Second Moult.—Length three-quarters of an inch. Colour grey; dorsal and sub-dorsal lines amber, the dorsal having twelve blotches of a darker shade; side lines dark brown. Under the side line comes a spiracular line of grey, and then a brown line touching the legs. Head large, amber coloured; thickly indented like a thimble, and marked with four longitudinal rows of brown dots. Under the microscope the body is seen to be thickly set with elongated amber-coloured warts—the brown warts having disappeared.

In feeding the insect has changed its posture, carrying its head upwards and cutting through the blade till the top falls off; then eating across, always working from the near edge, systematically shortening the blade and lowering itself when necessary.

Moulted Aug. 14th. Inert and sickly-looking before the change.

Larva After Third Moult.—Length nine-tenths of an inch. General colour grey; thickly covered with light brown hairs. Spiracular line whitish. Spiracles kidney-shaped, chocolate-coloured with a yellowish white perpendicular line through the centre. Dorsal line represented by twelve brown spots; sub-dorsal lines very faint. Head large, has five warty dark brown spots on each side. Mandibles brown.

Moulted Sept. 1st.

Larva After Fourth Moult.—Length one inch and five-sixteenths of an inch. Head pale brown, indented, set with reddish hairs, and having six longitudinal rows of dark brown dots, also on either side five dark warts. Mandibles brown; general colour of the body pale green, thickly set with reddish hairs. Dorsal line dark green, bearing the twelve oblong brown spots. Pale sub-dorsal lines, and dark green side lines bordered below with a pale streak. Spiracles dark brown. Caudal fork has a slight rosy tinge. Fore legs colour of head.

I left home for England on the 4th of October, having provided a sufficiency of growing sedge, embedded in sphagnum, for the use of *Jutta*. I returned in February, and found the larvæ fresh and plump, but quite torpid. They had undergone the 5th moult (probably in October). On the 6th of April they revived,

MATURE LARVA AFTER HIBERNATION.—Length one inch and a quarter. Body pale pea-green, set with light brown hairs. Legs of the same hue of green. Head green with six rows of brown dots; indented. Twelve greenish-brown spots along the back; side-lines dark brown; spiracles black.

After their revival the larvæ ate little, if anything. They pupated April 21st.

CHRYSALIS.—Length five-eighths of an inch; greatest breadth one-fourth of an inch. Head-case amber-coloured, with a brown dash on either side. Wing-cases pea-green, outlined and streaked with brown. Thorax prominent, abdomen conical, in colour pale yellowish green, with dorsal line of darker green and numerous longitudinal rows of brown dots. Extremity of abdomen rosy.

The perfect insect appears in this locality from May 31st to June 15th.

PARASITES ON DANAIS ARCHIPPUS AND ANTHOMYIA RAPHANI.

BY C. P. GILLETTE, AGRICULTURAL COLLEGE, MICH.

I am not aware that any parasites have ever been reported as attacking the larvæ of *Danais archippus* or the maggots of *Anthomyia raphani*. However that may be, it will be of interest to the readers of the ENTOMOLOGIST to know that last fall I obtained from a single chrysalis of *D. archippus* over fifty specimens of a new species of *Pteromalus*. The parasites came forth September 13, the chrysalis having been brought into the laboratory a few days before, and inclosed with a bell-jar. Specimens were sent to Mr. L. O. Howard, who has since described the species and given it the name of *Pteromalus archippi*.

The parasites from *A. raphani* belong to the genus *Eucoila*, and are probably a new species also. A large number of pupæ and full-grown maggots of *A. raphani* were put in a jar containing earth, from which the flies began to come forth June 9. The jar remained covered with gauze until September 2, when the parasites began to appear, and in a few days eight specimens were obtained.

In connection with the latter parasite it may be well to note the fact that a red garden mite, a species of *Trombidium*, did excellent service

last summer in the College garden by feeding greedily upon the eggs of *Anthomyia brassicæ*. It was not uncommon to find nearly a half teaspoonful of empty egg shells about the stems of the plants, and in such cases a number of the mites were always to be found just below the surface near the plant.

For experiment's sake three of these mites were kept in a jar of moist earth for a time, and fed each day upon fresh eggs, when it was found by actual count that they would suck, on an average, twenty-eight eggs each and every day.

Many of the plants did well and produced fine heads, that I am certain would have withered and died had not these mites devoured enormous numbers of the *Anthomyia* eggs.

DESCRIPTIONS OF SOME LEPIDOPTEROUS LARVÆ.

BY WM. BEUTENMULLER, NEW YORK.

Datana integerrima, Gr. & Rob.

BEFORE LAST MOULT.—Head and cervical shield shining jet black. Body deep reddish brown, with three very fine, narrow, sordid white stripes along each side, and a broader one below the spiracles, which are black, and another stripe along the middle of the venter. Thoracic feet, extremities of abdominal legs and anal legs jet black, shining. The body is also covered with sordid white hairs. Length 32 mm.

MATURE LARVA.—Body wholly jet black, and covered with very long floss-like, sordid white hairs, becoming yellowish as the larva undergoes its changes to the pupa. Thoracic feet black, shining. Abdominal legs black outside and reddish-brown on the inner side. Length 55 mm.

Lives together in large companies on walnut *(Juglans)*, hickory *(Carya)*, beech *(Fagus)*, and also on oak *(Quercus)*, but very rarely.

In several individuals of the brood of this species, in the last stage, there are visible a sub-dorsal, ill-defined, white, longitudinal stripe, and a rather broad wavy lateral stripe below the spiracles, and sometimes there is also a white stripe along the middle of the underside. In all else resembling the typical form.

Datana contracta, Walk.

BEFORE LAST MOULT.—Head and cervical shield jet black, shining. Body black, with four equidistant sordid white stripes along each side,

being as wide as the intervening spaces, except the dorsal space which is the widest. Body beneath concolorous to the above, with three longitudinal stripes, and the intervening spaces much broader. On each of the 4, 5, 10 and 11 segments two reddish brown patches. Thoracic feet and claspers of the abdominal legs jet black, with their bases reddish brown. The body is also sparsely covered with sordid white hairs. Length about 30 mm.

MATURE LARVA.—The cervical shield now becomes orange yellow, and the stripes creamy white. Otherwise as in the previous stage. Length 55 mm.

FOOD PLANTS.—Oak *(Quercus)*, chestnut *(Castania)*, hickory *(Carya)*.

Datana Angusii, Gr. & Rob.

Head and cervical shield jet black, shiny. Body black, with four very narrow, pale yellow stripes along each side, all being much narrower than the intervening. On the underside three pale yellow stripes. One along the middle, which is the broadest, and one on each side being broken by the legs; the intervening spaces are much wider than those above. Thoracic feet black. Abdominal legs reddish, with the extremities jet black. On the 4, 5, 10 and 11 segments two reddish patches. Body with sparsely distributed sordid white hairs. Length 55 mm.

FOOD PLANTS.—Hickory *(Carya)* and walnut *(Juglans)*.

The following synoptical table may serve in determining the larvæ of the genus *Datana*. The larvæ of *D. robusta*, Strk., and *D. major*, G. & R., are unknown to science:—

STRIPES NARROWER THAN THE INTERVENING SPACES.

Body black, stripes sulphur yellow..... *Ministra.*
Body black, stripes citron yellow, confluent posteriorly..... *Drexelii.*
Body black, stripes very fine, pale yellow..... *Angusii.*
Body black, stripes absent..... *Integerrima.*

STRIPES AS WIDE OR WIDER THAN THE INTERVENING SPACES.

Body black or red, stripes bright lemon yellow..... *Perspicua.*
Body black, stripes creamy white..... *Contracta.*
Body black, stripes yellowish, head and anal plates red..... *Floridana.*

Hadena turbulenta, Hüb.

Head jet black, shining; mouth parts sordid white. Body above jet black, with a number of fine longitudinal stripes, beginning at the anterior portion of the second segment and running to the end of the tenth segment; last segments black, with a number of white spots. Cervical shield velvety black, with a few semilunate spots on the anterior portion, and posteriorly margined with white. Body at the sides and beneath dull amber yellow. Along the sides are three white stripes; the two below the stigmata run from the anterior portion of the first segment to the last segment, while the remaining stripe runs the same as those above. Thoracic feet black, shining. Abdominal and anal legs dull amber yellow, with a brownish patch, followed by a white one, on the outerside. All the stripes on the black portion of the body are connected in pairs by a fine transverse stripe at the posterior extremity. Lives socially on catbriar (*Smilax*). September.

THE ENTOMOLOGICAL CLUB OF THE A. A. A. S.

We are requested to announce that the next meeting of the Club will be held at Cleveland, Ohio, in the High School Building, beginning at 9 a. m., on Wednesday, the 15th of August. This date is a week earlier than that at first decided upon for the meeting of the A. A. A. S. As this location is central and convenient alike for both United States and Ontario Entomologists, it is expected that there will be a large attendance, and an interesting and enthusiastic meeting. All entomologists are requested to come prepared to aid in the matter; those who desire to present papers should send to the Secretary, Prof. A. J. Cook, Agricultural College, Mich., the subject they propose to discuss in order that it may be announced in the programme.

CORRESPONDENCE.

DANAIS ARCHIPPUS.

Dear Sir: I wish to enquire through your columns whether any progress has been made lately in explanation of the migratory habit of *Danais archippus*. The last information I have got on the subject being from the vividly descriptive pen of Dr. John Hamilton (CAN. ENT., Vol. xvii., No. 11), who showed clearly, that, up to that time, the facts and

the theories had failed to agree. Several causes have combined recently to turn my attention to the subject, notably a question from Mr. W. H. Edwards, as to its time of ovipositing here, which I could answer only in the most general terms. I have always regarded it as a misfortune that Mr. Roland Thaxter, in his account of what he saw in Florida (CAN. ENT., Vol. xii, No. 2), did not give the month or months in which his observations were made; it might have assisted us much in forming an opinion as to whether they were flocks from the north come for the purpose of going into hibernation or not, although the fact of some of them pairing is decidedly against the idea that these, at all events, intended to hibernate. They make their appearance here about the latter part of May, according as the season favors; the first ones are restless and energetic, like males looking for mates; not in the least broken or damaged; not so rich and bright in color as fall specimens, but fairly good withal. In a week or so they become more plentiful, and begin to mate, and for a time are scarcely seen but in pairs. Shortly after eggs may be found on the flower clusters of the milk-weed, which is not yet in bloom. They never seem to entirely disappear till fall, fresh hatched specimens mingling with the old battered ones of the early season. Their conduct in spring is quite in harmony with that of species which hatch from the chrysalis here. If they hibernated in this locality I should expect them to put in an appearance a good deal earlier than they do. I regard it as a particularly interesting creature in every respect; although so common, it is never "vulgar," never in a hurry; it has the easy grace of the leisurely class. I have thought that one who has seen it only in an open country can form but an inadequate conception of the diversity of its movements on the wing. To see one on a bright summer day, when a stiff breeze is blowing, disport itself about the wide-spreading top of a high tree, is a choice pleasure. It seems to fairly revel with delight in a gale; now it rolls and tosses and heaves, always heading against the wind; now it spreads its sails to the breeze, and is hurried violently backward and upward; again it furls them, and, slowly descending and advancing, it describes a variety of the most charmingly graceful curves and waves and undulations imaginable; a thing of beauty to look at, and a joy to think of forever after. Attempts have been made to attach to it common names. I have thought, when watching one at such a time, that "the storm king" would be very appropriate, and quite befitting its regal

character. In my former scrap on this insect, an error in punctuation occurs, which makes it rather confusing. The " at least every other day " there refers to my visiting the woods, not to the movements of the butterflies. I have but little of personal observations to add to it, having seen but one small gathering since. A stream of *Archippus* from the side of a wood attracted my attention. I entered to watch it go. There was nothing of the listless attitude of my former observations in this group. There was a general uneasiness pervading the whole flock, rather difficult to describe. It did not come from a working of the wings, but of the feet, as if the foothold was not good, and they were trying to secure a better, which produced a rocking motion, whilst continuously throughout the swarm one and another was dropping off to make for the edge of the woods and join in the grand procession.

J. Alston Moffatt, Hamilton, Ont.

THE CLOVER-ROOT BORER, HYLASTES TRIFOLII, MULLER

Dear Sir:—As far as I know, this insect has not been mentioned in the Entomologist as occuring in Ontario. The beetle has appeared in this locality, and is doing incalculable damage to the clover fields. At the time of writing this, the beetles, which have hibernated in the root during the winter, have not all left their retreats, and may be counted by the dozen in roots badly infested. No doubt the insect has been working in our midst for some time, and at present fully three-fourths of the red clover, *Trifolium pratense*, is dead or dying from the injury caused to the root. The damage has not been all occasioned by the larvæ during the past season, for I found the perfect beetle driving channels in various directions through the roots during May and the early part of June. My observations correspond so well with the description given by Mr. W. Saunders in the annual report of the Entomological Society of Ontario, 1881, page 43, that I need only refer the reader to his paper.

June 9, 1888. J. White, Edmonton, Ont.

Dear Sir: Mr. Brehme, in his article on "The Early Stages of Arzama Obliquata," after stating its manner of feeding in the reed, says, "It then returns to the top and forms its pupa there." I would remark that that is not its invariable habit in nature, for I have found the chrysalis in early spring beneath the bark of a decaying stump, corresponding in that respect with Diffusa, and in some instances quite a distance away from the marsh where the reeds grow. From Mr. Brehme's dates it would appear to be double brooded with him.

J. ALSTON MOFFAT, Hamilton, Ont.

ON BOLINA FASCIOLARIS, HÜBN.

Dear Sir: In the pages of the CAN. ENT. I showed that Mr. Morrison's statement, that we had re-described *Bolina fasciolaris* Hübn., was an error, based upon a mistaken identification of Hübner's species. That my determination was correct, is proved by a letter of Mr. Butler's, published in *Entomologica Americana*, vol. iv., p. 13, where a specimen of the true *B. fasciolaris*, as determined by myself, is alluded to from my collection. This specimen came to me as from "Mexico." To my knowledge *B. fasciolaris* does not occur in our limits, but not improbably it may be found in the south-west. Mr. Butler thinks that it is highly probable that *B. ochreipennis* Harvey is the male of *B. nigrescens* G. & R., and thus repeats the suggestion already made by myself. The species will be known as *nigrescens*, this name being much the older. The genus *Bolina* of Duponchel is, in my opinion, incorrectly used, and our species should be referred to *Melipotis* of Hübner, as I have done in my Check List, where *ochreipennis* is doubtfully referred to as the male of the preceding species, *nigrescens* G. &. R. (p. 39, No. 1145). The sexual distinction in ornamentation in *Melipotis* is peculiar and interesting.

A. R. GROTE.

CHANGE OF ADDRESS.—Mr. C. H. T. Townsend requests us to state that he has left the Adjutant-General's Office, War Department, and is now an assistant in the Division of Entomology, Department of Agriculture, Washington, D. C.

OBITUARY.

Miss Annie M. Wittfeld, only daughter of Dr. Wm. Wittfeld, of Fairyland, Indian River, Florida, died suddenly of rheumatism of the heart on the 10th April, aged 23. Fifteen months before—to a day—Dr. Wittfeld had lost his only son by brain fever while down the coast on a boating expedition, and so the stricken parents are desolate. It is about ten years since Miss Annie began to aid me in obtaining eggs and larvæ of butterflies, and it is mostly owing to her zealous, friendly and intelligent assistance that I have been able to learn the history of so many Florida species. Her death is a loss to science. The readers of this magazine will sympathize with Dr. and Mrs. Wittfeld in their bereavement.

W. H. EDWARDS.

DEATH OF THE "YOKOHAMA NATURALIST."

Particulars have been received of the death in Japan, on the 17th of February, of Mr. Harry Pryer, C. M. Z. S., the Yokohama naturalist, at the early age of thirty-seven. When Mr. Pryer went to Japan in 1870 he was already known as an active Fellow of the Entomological Society of London. In the intervals of a busy mercantile career he interested himself in Japanese natural history, and soon became a recognized authority on the subject. In conjunction with Captain F. Blakiston, he wrote the standard monograph on the birds of Japan, and at the time of his death he was engaged in publishing in English and Japanese an important work on the butterflies of Japan, entitled "Rhopalocera Nihonica." Mr. Pryer was not only an assiduous collector, but a keen observer and a practical investigator, and his researches on the parasites of the silk worm have been of material advantage to the silk culture of Japan. His house and garden were filled with valuable specimens and collections of animals and insects, living and dead, and the loss sustained by the European community through his death is shared by the Japanese, who recognize the valuable services he rendered in connection with the establishment and maintenance of the museum at Tokio.—*Pall Mall Gazette.*

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LIST OF THE SPIDERS, MYRIOPODS AND INSECTS OF LABRADOR.

BY A. S. PACKARD, PROVIDENCE, R. I.

A list of all the known species of terrestrial Arthropods of the Labrador coast may prove convenient as a starting point for future investigations. Hence I have, besides enumerating the species of other groups, revised the lists of Lepidoptera—Mr. Scudder kindly contributing the list of butterflies. For changes in the names of the Tortricidæ I am indebted to Prof. C. H. Fernald's excellent catalogue of the Tortricidæ of the United States.

ARACHNIDA.

The spiders which I collected at various points on the coast were sent to Prof. T. Thorell, of Upsala, for identification and description. Out of ten species collected, seven were new to science. Prof. Thorell's paper was published in the Proceedings of the Boston Society of Natural History, xvii., April 21, 1875.

Epeira patagiata (Clerck). Square Island, Strawberry Harbor.
" *Packardii* Thor. " "
Tetragnatha extensa (Linn.) " "
Linyphia Emertonii Thor. " " and near Dumplin Harbor.
Clubiona frigidula Thor. " "
Gnaphosa brumalis Thor. Strawberry Harbor.
Lycosa Greenlandica Thor. " "
" *furcifera* Thor. Square Island, and near Dumplin Harbor.
" *fuscula* Thor. Strawberry Harbor.
" *Labradorensis* Thor. Strawberry Harbor and Square Island.
Xysticus Labradorensis Keys. K. K. Zool. Bot. Ges. Wien., 479, 1887. Ungava Bay (Turner).

MYRIOPODA.

Julus sp. Square Island.

INSECTS.

Orthoptera.

Caloptenus. A Pezzotettix-like species, with short wings. Square Island

Odonata.

Diplax sp., near *rubicundula.* Caribou Island. Dragon flies were very rare on the coast, and I saw none north of the Straits of Belle Isle.

Æschna sp. Caribou Island. Perhaps another species (identified by Dr. P. R. Uhler,) also occurred, and an Æschna-like form was observed at Tub Island.

Hemiptera.

Teratocoris sp.

Deltocephalus debilis Uhler. Hopedale. A few other species of Cercopidæ were seen at Caribou Island.

Trigonotylus ruficornis Fallen. Hopedale.

Corixa sp.

Platyptera.

Pteronarcys regalis. Okkak. Hopedale.

Plectoptera.

Potamanthus marginatus Zett. This boreal European May-fly, occurring in Lapland, we have found in abundance in southern Labrador.

Perla sp. Belles Amoures.

Chloroperla sp. A small greenish species was observed at Strawberry Harbor.

Trichoptera.

Desmataulius planifrons Kol. Okkak.

Limnophilus subpunctulatus Zett. This Lapland Caddis-fly is the most abundant species in Labrador, and what are probably its cases are common in the pools of fresh water. Three or four other species also occurred, but have not been identified. No genuine *Neuroptera* or *Mecaptera* (Panorpidæ) occurred.

COLEOPTERA.

Lepyrus colon (Linn.) Cape Chidley (R. Bell).

Pissodes ? sp. Hopedale.

Coccinella lacustris Lec. Okkak.

Leptura sp. Caribou Island.

Criocephalus obsoletus Randall. Okkak.

Argaleus nitens Lec. Near Cape Harrison.
Telephorus fraxini Say. Hopedale.
P. lævicollis Kirby. Hopedale.
Podabrus mandibularis Kirby. Caribou Island.
Sericosomus incongruus Lec. Square Island.
Eanus vagus Lec. Square Island.
E. pictus (Cand.) Horn. *(E. maculipennis* Lec.) Caribou Island to Square Island.
Cryptohypnus bicolor Germ. Belles Amoures, Strawberry Harbor and Indian Harbor.
Byrrhus Americanus Lec. Caribou Island.
B. Kirbyi Lec. *(B. picipes).* Caribou Island.
Atomaria. Not determined. Caribou Island.
Ips sanguinolentus Oliv. Caribou Island.
Bledius. Not determined.
Quedius sublimbatus Mökl. Blanc Sablon (R. Bell).
Tachyporus n. sp. Hopedale.
Creophilus villosus Gray. Caribou Island.
Agathidium obsoletum Lec. Square Island.
Silpha Lapponica Linn. Caribou Island to Hopedale.
Philhydrus bifidus Lec. Caribou Island.
Gyrinus picipes Aubé? Square Island.
G. minutus Linn. Square Island.
G. affinis Aubé? Square Island.
Colymbetes picipes Kirby. Caribou Island and Strawberry Harbor.
C. binotatus Harris (probably).
C. sculptilis Harris. Caribou Island, Square Island, Hopedale.
C. nov. sp. Square Island.
Agabus parallelus Lec. Square Island.
A. longulus Lec.? Stupart's Bay (R. Bell).
A. ambiguus Lec. *(A. infuscatus* Aubé). Caribou Island.
A. subfasciatus Lec. Caribou Island.
A. semipunctatus (Kirby). Caribou Island.
A. lævidorsus Lec. Caribou Island.
A. punctulatus Aubé. Caribou Island.
A. discolor Lec. Indian Harbor.
Hydroporus catascopium Say. Square Island and Dumplin Harbor.
H. tenebrosus Lec. Caribou Island.

H. puberulus Lec. Sloop Harbor and Dumplin Harbor.
H. longicornis. Stupart's Bay (R. Bell).
H. perplexus Shp. Stupart's Bay (R. Bell).
Trechus micans Lec. Belles Amoures.
Patrobus tennis Lec. Square Island.
P. hyperboreus Dejean. Belles Amoures, Straits of Belle Isle, Cape Chidley (R. Bell).
Harpalus herbivagus Say., var. *proximus* Lec. Square Island.
Amara obtusa Lec.
Amara, near *A. melanogastrica* Esch., perhaps *A. brunni.*
A. pennis Dej. Caribou Island.
Amara, "no name." Strawberry Harbor, Square Island and Hopedale.
A. similis Lec. (*Stereocerus similis* Kirby). Caribou Island.
A. hæmatopus Kirby. Sloop Harbor, Hopedale, Okkak (S. Weiz).
Pterostichus adstrictus Esch., var. *orinomum* Kirby. Mecatina; Gulf St. Lawrence.
Pterostichus hudsonicus Lec. Stupart's Bay (R. Bell).
Pt., species not determined. Hopedale, Sinker Island, off Cape Harrison (Cape Webuc).
Pt. luczottii Dej. Blanc Sablon (R. Bell).
Platynus sinuatus Dej. Belles Amoures, Straits of Belle Isle.
Calathus ingratus Dej. Whole coast.
Carabus chamissonis Fischer. Domino Harbor and Okkak.
Nebria Sahlbergii Fischer. Sloop Harbor, Cape Chidley (R. Bell).
Notiophilus Sibiricus Motsch. Domino Harbor, Square Island.

DIPTERA.

Scatina estotilandica Rondani, Archiv, etc. Canestrini iii., fasc. 1, 35, Labrador. Osten Sacken adds: Mr. Rondani, in the same place, mentions *Scatophaga diadema* Wiedemann (Montevideo), as having been received from Labrador.
Helophilus glacialis Loew. Stett. Ent. Zeit. vii., 121.
" *groenlandicus* (O. Fabr.)
Dolichopus stenhammari Zett. Sloop Harbor, July 19.
Therioplectes flavipes Wied.
" *septentrionalis* Loew. Verh. Zool. Bot. Ges. Wien., 1858, 593.
Tipula tessellata Loew. Cent. iv., 4.
Tipula septentrionalis Loew. Cent. iv., 3.

Amalopsis hyperborea O. Sacken. Monogr. iv., 269.
Dicranomyia halterata O. Sacken. Monog. iv., 71.

LEPIDOPTERA.

Tineidae.

Glyphipteryx sp. Caribou Island.
Tinea fuscipunctella Harv. *(= Œcophora frigidella* Pack.*)* Caribou and Square Islands.
Œcophora sp. Hopedale.
Incurvaria Labradorella Clem. Caribou Island.
Ornix boreasella Clem. Caribou Island.
Tinea spilotella Tengström. Caribou Island, Square Island, "Okkak, June." Christoph.
Gelechia continuella Zell. Moeschl. (= trimaculella Pack.) Strawberry Harbor.
Gelechia labradorica Moeschl. Moravian Stations.
" *brumella* Clem. Caribou Island.

Tortricidæ.

Grapholitha nebulosana Pack. Strawberry Harbor.
Phoxopteris plagosana (Clem.) Caribou Island and Square Island.
" *tineana* Hübn. (Pandemis leucophalerata Pack.) Hopedale.
Sericoris bipartitana (Clem.) Caribou Island.
Pædisca solicitana (Walk.) (Halonota packardiana Clem.) Caribou Is.
Sericoris turfosana H. S.
" *glaciana* Moeschl. Whole coast; common.
Penthina capreana (Hübn.)
" *murina* Pack. Caribou Island.
" *septentrionana* Curtis. Sloop and Strawberry Harbors. (Polar regions, Curtis.)
" *intermistana* (Clem.) (P. tessellana Pack.) Caribou Island to Hopedale.
frigidana Pack.
Conchylis deutschiana Zetterstedt (Lozopera? fuscostrigana Clem.; C. chalcana Pack.)
Sciaphila osseana Scopoli (Ablabia pratana Hübn.)
" *moeschleriana* (Wrcke).
" *niveosana* Pack. Moravian Stations, August.

Pyralidae.

Crambus unistriatellus Pack. Caribou Island.
" *argillaceëllus* Pack. Square Island.
" *trichostomus* Christoph. Moravian Stations.
" *labradorensis* Christoph. "Okkak, July."
" *albellus* Clem. Mouth of Esquimaux river, Aug. 3.
" *inornatellus* Clem. Caribou Island, July 15.
Eudorea centuriella Christoph. (*Pempelia fusca* Harv., *Eudorea*? *frigidella* Pack.)
Eudorea? *albisinuatella* Pack. Okkak.
Pyrausta borealis Pack. Square Island.
Botys ephippialis Zettst.
" *torvalis* Moeschl.
" *inquinatalis* Zell. (Scopula glacialis Pack.) Hopedale.

Phalænidæ.

Eupithecia luteata Pack. Caribou Island, July.
" *gelidata* Moeschl. Moravian Stations.
Glaucopteryx caesiata (S. V.) Whole coast.
" *polata* (Dupon.) Whole coast.
" *phocataria* Pack.
Epirrita dilutata (Borkh.) Moravian Stations.
Petrophora truncata (Hufn.) Whole coast.
" *prunata* (Linn.) " "
" *populata* (Linn.) " "
" *suspectata* Moeschl. Moravian Stations.
Ochyria munitaria Hübn. Caribou Island and var. *labradorensis* Pack.
" *abrasaria* H. Sch. Caribou Island.
Rheumaptera lugubrata Staud. Whole coast.
" *postata* (Linn.) Whole coast.
disceptaria (F. R.) Moravian Stations.
Triphosa dubitaria (Linn.) Caribou Island.
Semiothisa dispuncta Walk. (Sex-maculata Pack.) Square Island.
Anaitis sororaria Hübn. Moravian Stations.
Aspilates gilvaria S. V. " "
Acidalia sentinaria Hübn. " "
" *frigidaria* Moeschl. " "

Noctuidae.

Brephos parthenias (Linn.) Moravian Stations.
Plusia u-aureum Boisd. " "
" *parilis* Hübn. " "
" *divergens* Fabr. " "
Anarta funesta (Thunberg). " "
" *melanopa* (Thun.) " "
" *melaleuca* (Thun.) " " Whole coast.
" *vidua* Christoph. " "
" *cordigera* (Thun.) " "
" *algida* Lef. " "
" *lapponica* (Thun) " "
" *schonherri* Zett. " "
" *zetterstedtii* Staud. " "
Hadena exulis Lef. " "
" *exornata* Moeschl. " "
Pachnobia carnea Thun. " " Whole coast.
Mamestra arctica Boisd. Whole coast.
Dianthoecia subdita Moeschl. Moravian Stations.
" *phoca* Moeschl. " "
Agrotis septentrionalis Moeschl. " "
" *fusca* Boisd. " "
" *Wockei* Moeschl. " "
" *speciosa* Hubn. " "
" *comparata* Moeschl. " "
" *dissona* Moeschl. " "
" *umbratus* Pack. " "
conflua Fehr.. " "
Leucania rufostrigata Pack. Caribou Island.

Bombycidæ.

Hepialus labradoriensis Pack. Caribou Island.
" *hyperboreus* Moeschler. Moravian Stations.
Laria Rossii (Curtis) Whole coast.
Arctia Quenselii Paykull. Whole coast.
Platarctia borealis (Moeschler). Moravian Stations.
Euprepia caja (Linn.) Whole coast.

*RHOPALOCERA.

Brenthis chariclea (Schneid). This is the Argynnis boisduvalii of the previous list. A detailed description of the species, drawn up exclusively from American material, will be found in the Proc. Bost. Nat. Hist., Vol. xvii., p. 297.

Brenthis triclaris (Hübn.) = Argynnis triclaris of the previous list. A full description will be found as above on p. 294.

Brenthis polaris (Boisd.) = Argynnis polaris of the former list. A full description, based entirely on Dr. Packard's material, will be found as above, p. 303.

Brenthis frigga (Thunb.) = Argynnis frigga of the former list. The single male obtained in Labrador, with specimens from Colorado, taken by Mr. Mead, form the basis of a detailed description in the same place as the preceding, p. 306.

Eugonia j-album (Boisd.-Lec.) = Grapta interrogationis of the previous list. This is the worst error in that list, and a case of pure carelessness in writing.

Œneis jutta Hübn. = Chionobas jutta of previous list.

" *bore* (Esp.) = Chionobas bore of former list.

" *œno* (Boisd) = Chionobas œno of former list.

Agriades aquilo (Boisd.) = Lycæna aquilo of former list. An extended description from Dr. Packard's material will be found in the Proceedings of the Bost. Soc. Nat. Hist. vol. xvii, p. 310.

Pieris frigida Scudd. I have not re-examined this.

Eurymus Labradorensis (Scudd.) This is the *Colias palæno*, as well as the *C. Labradorensis* of the previous list. The specimen referred to the former being of the same species as the latter. I will not here venture on a discussion as to the validity of the specific name retained here, but as the species was described and figured sufficiently for determination, and is the common form in south-eastern Labrador, it is easily identifiable.

*A revised list of the butterflies obtained in Labrador by Dr. A. S. Packard, by Samuel H. Scudder. (The list was prepared for use in the present work. The species have been arranged in the descending order by the author.) In 1886 I published a list of Dr. Packard's collections in the Proceedings of the Boston Society of Natural History, Vol. xi. The present list is merely a redetermination of the same material, in the light of larger collections since seen. The same order as before is followed. The specimens are mostly in my collection and in that of the Museum of Comparative Zoology.—S. H. S.

Eurymus nastes (Boisd.) = Colias nastes of former list. I have not re-examined specimens, as they are apparently no longer extant.

Pamphila comma (Linn) = Hesperia comma of my former list. The single specimen obtained was not examined by me in my study of the species of Pamphila (Memoirs Bost. Soc. Nat. Hist. ii., 341), and is the only specimen I have seen of P. comma from America. It belongs to the var. catena Staud, found in northern Scandinavia and Lapland, and exactly resembles the specimen of that variety figured by me in the memoir referred to above. Moschler has already noted that it is this variety which occurs in Labrador.

Hesperia centaureae Ramb. Nothing to be added.

HYMENOPTERA.

Urocerus flavicornis Fabr. Common on Caribou Island.
" *cyaneus* Fabr. Hopedale.
Euura orbitalis Norton. Var. a. b. Caribou Island.
Nematus Labradoris Norton. Caribou Island.
" *malacus* " " "
" *fallax* " " "
" *monela* " " "
" *fulvipes* " " "
" *placentus* " " "
Allantus originalis " " "
Macrophya (Pachyprotasis) omega Norton. Caribou Island.
Tenthredo mellinus Norton. Caribou Island.
" *cinctitibiis* " " "
Formica herculanea Linn. Whole coast.
" *sanguinea* Latr. Straits of Belle Isle.
Vespa maculata Linn. Southern coast, Mecatina Island.
norvegica Fabr. Caribou Island.
Bombus lacustris Cresson. Whole northern coast; common.
" *kirbyellus* Curtis. Sloop Harbor and Hopedale.
" *frigidus* Smith. Square Island and Hopedale.
" *nivalis* Dahlb. Caribou Island and whole coast northward.

JOHN ABBOT, THE AURELIAN.

BY SAMUEL H. SCUDDER.

It has been a fortunate thing for the study of butterflies in this country that the earlier students were those who devoted themselves very largely to the natural history of these insects rather than to their systematic or descriptive study. It was indeed a natural and healthy result of the poverty of external resources in earlier times; and I have thought that it would not be devoid of interest to present a few facts concerning the life and industry of one of these earlier naturalists, who worked to such good purpose and accomplished so much, under circumstances that would now seem very forbidding.

A unique figure, perhaps the most striking in the early development of natural history in America, is that of a man of whom we know almost absolutely nothing excepting what he accomplished. With one exception, all our knowledge of his personality comes through tradition. No life of him has ever been written, excepting a brief notice by Swainson in the Bibliography of Zoology, to which Mr. G. Brown Goode has kindly called my attention. It is not known when or where he was born, or when he died; scarcely where he lived, or to what nationality he belonged. Even the town where he worked no longer exists. His name alone remains, and though we have access to not a little of his writing in his own round hand, his signature cannot be discovered.*

John Abbot was presumably an Englishman, as the name is English, and he is said by Sir. J. E. Smith, to have begun his career by the study of the transformations of British insects. When not far from thirty years old, and probably about 1790, he was engaged by three or four of the leading entomologists of England, to go out to North America for the purpose of collecting insects for their cabinets. After visiting several places in different parts of the Union, he determined to settle in the "Province of Georgia," as Swainson calls it. Here he lived for nearly twenty years in Scriven County, as I am informed by several persons through the kindness of Dr. Oemler, of Wilmington Island, in that State, returning to England probably not far from 1810, where he was living about 1840, at the age "probably above eighty." It is rumored in

*Mr. W. F. Kirby has kindly made many researches for me at the British Museum, the Linnæan Society, etc.

Georgia that he owned land there, and all that can be learned of him comes from persons beyond middle life in that State, who remember hearing their parents speak of him. Col. Charles C. Jones, the Georgia historian, informs me through Dr. Oemler that "while he remained in Georgia, in the prosecution of his scientific labors, his head-quarters were at Jacksonborough, then the county seat of Scriven County. Here his work on the Lepidoptera of Georgia was largely prepared. All traces of this old town have now passed away." It is supposed that he also employed himself as a school-master in this place, but this is purely traditional, and his occasional bungling, not to say ungrammatical sentences, rather indicate a lack of schooling on his own part. What we certainly know regarding him is that he entered into relations with John Francillon, a silversmith in the Strand, London, who had a famous collection of insects and an extensive entomological correspondence. Francillon undertook to supply subscribers with drawings of insects and plants by Abbot, as well as with specimens, the latter of which, says Swainson, "were certainly the finest that have ever been transmitted as articles of commerce to this country; they were always sent home expanded, even the most minute; and he was so watchful and indefatigable in his researches, that he contrived to breed nearly the whole of the Lepidoptera. His general price for a box-full was sixpence each specimen; which was certainly not too much, considering the beauty and high perfection of all the individuals. Abbot, however, was not a mere collector. Every moment of time he could possibly devote from his field researches was employed in making finished drawings of the larva, pupa, and perfect insect of every lepidopterous species, as well as of the plant upon which it fed. These drawings are so beautifully chaste and wonderfully correct, that they were coveted by every one." It would appear from a note in Kirby and Spence's Introduction to Entomology (5th ed., iii., 148) that "the ingenious Mr. Abbot" also knew the art of inflating caterpillar skins, and dealt in them through Francillon. (See many other references in the same volume.) There still exist in various places, principally in the British Museum, but also at Oxford, Paris and Zurich, and in this country at Boston, large series of his drawings of insects and plants. Those in the British Museum are arranged in sixteen stout quarto volumes, bound in red morocco; each volume has a printed title page and is dated 1792 to 1809, the dates no doubt between which they were purchased for the Museum through Francillon from Abbot, and which probably indicated the period of his

activity in America. In Boston two similar volumes exist, one of which was presented by Dr. Gray of the British Museum, to Dr. Gray the botanist of Cambridge, and by him to the Natural History Society, where it may now be seen. The other volume is a collection, perhaps the only considerable one which has never passed out of this country, which was purchased by the Society from Dr. Oemler, of Georgia, who inherited it from his father.*

In the title page of the last volume of the British Museum series there is a miniature portrait let into the title page, which, tradition says, was painted by Abbot himself, and indeed it bears every mark of this, though there is no memorandum to this effect within the volume. With its peculiar physiognomy it adds considerably to our interest in the original; there seems to be not a little humour in the quaint features and figure, and the spare form hardly gives the figure of robust health which the face would indicate. Abbot probably returned to England about 1810, at an age of about fifty, and our portrait was doubtless painted at about this time, certainly before he left America, since it represents him in the thinnest of southern costume. There were old persons living in Georgia up to 1885, but since deceased, who knew him, but apparently none now remain.

Abbot's work was by no means on Lepidoptera alone, as any of the series of his drawings will show. Dr. Hagen, in speaking of the volume in the British Museum containing the Neuroptera, says that all the details are given with the greatest care, and that in almost all cases the species can be identified. The same is the case with most of the drawings of Lepidoptera, though there is a mark of carelessness in some of the figures of early stages which is not found in others; this is no doubt due to the fact that so many applied for these drawings, "both in Europe and America, that he found it expedient to employ one or two assistants, whose copies he retouched, and thus finished they generally pass as his own. To an experienced eye, however, the originals of the master are readily distinguished."

It would hardly appear that he paid more attention to Lepidoptera than to other insects. Yet in the Oemler collection alone there are one hundred and thirty-three plates of Lepidoptera, nearly every one of which

*Mr. Oemler and Mr. "Le Compte" are both mentioned in Abbot's notes as sending him specimens.

figures a species distinct from the others, and ninety-four of which are accompanied by the early stages. Twenty-two of these are insects figured in Abbot and Smith's work, but the figures of the early stages are in no case identical ; they represent the same insect but in different attitudes. Of these one hundred and thirty-three plates, thirty-four are concerned with the butterflies. The drawings of butterflies in the British Museum are contained in the sixth and sixteenth volumes, the former comprising the perfect insects only, the latter the early stages as well, and in this latter series thirty-six species are figured ; while the two Boston collections contain figures of the early stages of all but two of the species represented in the British Museum volume. Swainson states that a series of one hundred and three subjects of Lepidoptera, including none published before, was executed for him " with the intention of forming two additional volumes to those edited by Dr. Smith, but the design is now abandoned."

Each set of drawings furnished by Abbot seems to have been accompanied by more or less manuscript, in which the life history of the insect is given in brief form, with the food plant of the caterpillar and the times of the change of the caterpillars to chrysalids, and of chrysalids to butterflies, which shows that Abbot must have been an exceptionally industrious rearer of insects. Indeed the transformations of not a few of our butterflies are even now known only through the observations and illustrations of Abbot. Dr. Boisduval was good enough to present me with three series of manuscript notes entitled " Notes to the Drawings of Insects," all written in Abbot's own hand, and comprising twenty-seven foolscap pages, rather closely written, and describing the changes of two hundred and one species; of these thirty-eight are butterflies. These, unfortunately, are referred to only by number and by an English name, which Abbot himself applied, apparently to every insect of which he furnished drawings, such as the " reed butterfly," the " ringed butterfly," the " lesser dingy skipper," etc , though he occasionally makes use of such names as the " autumnal ajax," " Papilio antiopa," etc., showing his familiarity to a certain extent with Linnean names. As the names and drawings are in some instances kept together, the manuscript of those in which they are not connected is still of use. It appears that nearly all the Georgian butterflies were observed and painted by Abbot, and that of about sixty species which he raised he distributed illustrations and notes of the early stages to some of his correspondents.

As is well known by all aurelians, one considerable collection of Abbot's drawings was published by Sir James Edward Smith in two sumptuous folio volumes, but these comprise, as far as the butterflies are concerned, only twenty-four species. This work made an epoch in the history of entomology in this country. Besides this Abbot published nothing. The article credited to him in Hagen's Bibliography was by a Rev. Mr. Abbot, who wrote from England in November, 1798, when Abbot was in this country.

CHARACTERS OF PROTECTION AND DEFENCE IN INSECTS.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

A few years since I described a colony of Spanner caterpillars *(Geometridæ)* belonging to an undetermined species, and the description appeared afterwards in this journal. These larvæ were remarkable for their mimicry, in color and shape and attitude, of dead leaves. There could be no question that they belonged to the category of protective appearance, to which so many green and brown tinted larvæ belong, which share these "cosmical colors." In studying these larvæ we must consider their color, shape and attitude separately. The larvæ of most of the Hawk Moths belong to this category. The caterpillar in repose, or at the approach of danger, assumes a rigid attitude in which it resembles a leaf on a branch of the food plant. The markings along the back often assist this resemblance. The only motion is that imparted by the swaying of the plant on which it rests. When disturbed, the caterpillar of *Thyreus Abbotii* throws itself by jerks from side to side and gives out a crepitating noise. It looks then somewhat snake-like.

The second category is that of defensive appearance. Highly colored, red and yellow larvæ, belong many of them to this category, as also those armed with spines and prickles. These would seem to court observation, which they further aid by their restlessness. It is probable that, by their gaudy appearance, they inspire distaste or fear in their natural enemies. The caterpillars of *Orgyia* are not eaten by birds, nor are those of *Abraxas*. By simulating obnoxious species it has been shown that several kinds of butterflies escape destruction. From these two points of view the appearance of insects must be studied, but it by no means follows that the means to the end have been always perfectly attained.

It is owing to the imperfection of their protection that insects are, as a whole, kept under and an undue multiplication prevented. But there is, probably, an effort in these directions to be noted and brought out in the life history of all insects. Darwin's law of Natural Selection tends to bring out these characters more strongly by its effect of preserving the best protected kinds. I have noted how the species of *Catocala*, so numerous with us, are preserved; the larvæ, by their resemblance to twigs, the moths, from their upper wings, during the day and in repose, corresponding in appearance with the trunk and bark of the trees against which they rest. The larvæ of burrowing Lepidoptera resemble in their pale and livid colors those of the Coleoptera or burrowing larvæ of other Orders of Insects. The larvæ of Hymenoptera, which are external feeders, resemble the external feeding Lepidoptera in their greenish tints. There is then a correlation between habit and color. The larvæ of cut-worms *(Agrotis)* resemble the soil in color, where they burrow at the roots of plants.

In South Carolina I collected a number of specimens of an Orthopterous insect, which strikingly resembled the predaceous Cicindelidæ. They were active on the leaves of Okra. I regret that the specimens were lost, and I could not determine the species. I have observed that certain smooth Chrysomelidæ, living on a species of lily, on the approach of danger folded in the feet and allowed themselves to slide off the leaves, dropping in the herbage beneath where they speedily recovered the use of their legs. The snapping beetles, *Elateridæ*, assume a rigid attitude, the short feet tucked in against the under part of the hard body, and look like bits of dead wood or twigs. By their quiet and protective color they seem to expect that they will escape notice. This and similar actions in other kinds of beetles and insects is called "feigning death" by some writers. In order to "feign death," as the words intend, some knowledge of death as such and its advantages must be supposed. But I cannot think that insects have arrived at any such generalization of ideas. Their actions often incompletely answer to their apparent ends. It is probable to me that their attitudes of repose are assumed from the experience which they have gradually acquired that in a state of quiet they will best avoid the immediate dangers which beset them and which they cannot escape by flight. A *Catocala* will rest in quiet for hours, but on the near approach of a disturber will take to very quick and instant flight. Trying to capture a specimen once it thus escaped me, but in its endeavor to avoid Charybdis it fell into Scylla, for a passing swallow devoured it in the air.

The characters of protection and defense form an interesting subject in the natural history of external feeding larvæ, such as those of the Lepidoptera, for here the insect must rely on them and can do little or nothing by movement. Therefore they can here be the more readily detected. In tracing descent and relationship between the species, the modifications of the external characters of the larvæ must lead to the best results, to the safest conjectures as to the line taken. Almost all our knowledge as to any species and its habits is fragmentary and incomplete. What piece and parcel we observe we are apt to be very certain about, and we do not hesitate to draw therefrom very absolute conclusions, with an air of authority incommensurate with our knowledge. But in the multitude of counsellors there is in this case so far safety, that each may bring his observations and conclusions to paper, and, if the editor will print them, from the sifting of the whole a picture will in time be drawn which will stand in some proportion to the real truth.

THE ORANGE SPOT IN NATHALIS IOLE, Bdw.

BY T. D. A. COCKERELL, WEST CLIFF, COLORADO.

On November 1st, 1887, I took in this locality (Swift Creek, near West Cliff,) an example of *Nathalis iole*, and was thereby led to examine its characters. The general colour of the upper side of this insect is pale yellow. The primaries are marked with pale black (if one may use such a term,) after the manner described in the text books, and the upper margins of the secondaries also present a black patch, covering the area which is normally overlapped by the primaries. On this black patch, not far from the base of the wing, is an *elongated spot of the most vivid orange*. I first noticed this spot when setting out my specimen, and was led to wonder why the most vivid piece of colouring in the whole insect should be situated where it was invisible under ordinary conditions. Could it be due to some peculiarity in the development of the pigment induced by its peculiar position on the wing? was it a relic of the original colour of the insect, which not being under the same influences as the exposed parts, had not become modified in the course of ages? or was it a secondary sexual character to be exhibited by the raising of the primaries?

Being unable to answer these questions, I put the insect away until January 12th, when I sent it off with other butterflies to Mr. W. H.

Edwards, calling his attention to the presence of the orange spots. He wrote in reply that he could not tell why some examples of *N. iole* had the orange spot and others not, but that was a very variable species. On March 5th I received the box I had sent, and in it my [illegible] cimen of *N. iole*, which, to my great astonishment, had *completely lost the orange spots*,—they having become pale yellow, the colour of the rest of the wing (except the black portion), only somewhat glossy. The orange shade on the under side of the primaries, near the costal margin, had not faded in the least. Supposing that the butterfly might have been submitted to some unusual influence while in Mr. Edwards' hands, I wrote to him asking the exa[illegible] circumstances under which he had kept it, and he replied as follows: "The particular specimen which you sent and I returned never was outside your box, and the latter rested on top of one of my insect cases, so that no chemical influence was brought to bear on it. Last year I raised several *iole* imagos from larvæ, and the males I think all had the orange spot; I am sure some had. On looking at them now (March 16), I find *no orange at all*." So it is perfectly clear that the orange spot in *Nathalis* is of a peculiar nature, and is further liable to fade, which process is not one of continuous and gradual bleaching due to the action of light—because my specimen was all the time in a closed box in perfect darkness, and the orange remained as vivid as ever up to the time that I sent the insect to Mr. Edwards—but is more or less sudden, and apparently due to change in the *constitution* of a complex pigment, rather than its destruction. However this may be, I think that however insignificant this question may seem from the point of view of the systematist, it is one which the evolutionist will recognize as demanding his careful attention, and this must be my excuse for dealing with it at so great a length.

NOTE ON A GERMAN EDITION OF ROSS'S SECOND VOYAGE (1829-1833).

BY A. R. GROTE, A. M.

A copy of a German translation of Ross's Second Voyage lately fell into my hands, and I make the following bibliographical note upon the descriptions of Lepidoptera there given. The translation is by Julius, Graf von der Gröben, Lieutenant in K. Pr. Reg. Garde du corps, and the third part or volume is published in Berlin, 1836. This volume (8 vo.)

contains the natural history, the descriptions of the Lepidoptera occupying pages 238 to 255 inclusive. The following are the references:

Colias Boothii (Curtis), p. 238.
" *Chione* (Curtis), p. 239.
Hipparchia Rossii (Curtis), p. 241.
" *subhyalina* (Curtis), p. 242.
Melitæa Tarquinius (Curtis), p. 243.
Polyommatus Franklinii (Curtis), p. 245.
Laria Rossii (Curtis), p. 247.
Eyprepia Hyperboreus (Curtis), p. 249.
Hadena Richardsoni (Curtis), p. 250.
Psychophora Sabini (Kirby), p. 251.
Oporabia Punctipes (Curtis), p. 252.
Orthotænia Bentleyana (Don), p. 253.
" *Septentrionana* (Curtis), p. 254.
Argyrotosa (?) Parryana (Curtis), p. 254.

I have identified the moth *Laria Rossii* from specimens taken by Mr. Mann on Mount Washington, N. H.

DESCRIPTION OF A NEW SPECIES OF ANTHOCHARIS.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Anthocharis Pima.

MALE—Expands 1.75 inch.

Upper side yellow; the bases of wings dusted black; primaries have the basal half of costa white, crossed by dark brown streaks; the apex also edged white on both margins, and next this is a series of five large, elongated, dark brown spots, almost confluent, filling the interspaces to second medium nervule, each sending a narrow projection to the margin; on the arc a black rectangular bar, the area between this and the apical spots and costal edge orange; fringes whitish; a few blackish hairs at the end of each nervule on secondaries.

Under side of primaries yellow; the apical area greenish, dusted with black scales; the orange repeated paler and diffused over cell and second median interspace; the bar on arc repeated.

Secondaries pale yellow, largely covered by patches of light yellow-green, confluent, forming irregular and connected transverse bands from hind margin to base.

FEMALE—Expands 1.7 inch.

Same yellow; the apical spots longer and completely confluent, forming a solid patch; the orange paler; the bar on arc less rectangular; broadest on sub-costal; under side as in the male.

From two examples taken early in April, 1883, in Pima County, Arizona, by Mr. O. T. Baron. In all 2 ♂ and 2 ♀ were taken. This is the only known North American species in which both sexes are yellow. The brown apical patch is much larger than in the allied species.

BOOK NOTICE.

THE BUTTERFLIES OF SOUTH AFRICA.

South African butterflies: A monograph of the extra-tropical species. By Roland Trimen, F. R. S., etc., assisted by James Henry Bowker, F. Z. S., etc. Vol. I: Nymphalidæ; Vol. II: Erycinidæ and Lycaenidæ. London: Trubner & Co., 1887, 8 vo.

All who have studied foreign butterflies at all are acquainted with Trimen's work on the butterflies of Southern Africa, published more than twenty years ago, under the title Rhopalocera Africae Australis. It will please them to know that there has recently appeared the first two of three volumes on the same subject, which are based, indeed, upon the old, but wholly rewritten, and with a great wealth of additions, especially on the natural history side. These two volumes comprise the Nymphalidæ, Erycinidæ and Lycaenidæ, in all 238 species. The Papilionidæ and Hesperidæ are to occupy the third volume with about 142 species. It will thus be seen that Mr. Trimen falls into line with all the principal lepidopterists of England in the serial order in which he here places the different families of butterflies, adopting, indeed, exactly the subdivisions and the order Mr. Moore employed in his Lepidoptera of Ceylon, which we noticed lately. But he does more than that; for, in a long introductory chapter of 44 pp., he treats of the structure, classification and distinctive characters of the groups, together with their geographical distribution, their habits and instances of mimicry in an excellent manner, such as is very unusual in a work of this nature. It would interest every reader of the CANADIAN ENTOMOLOGIST. So, too, all the families, sub-families and generic groups are characterized with a fulness entirely proportional to the specific descriptions, rendering the work one of the best introductions to a fauna known to me. These descriptions are evidently the work of one who is quite familiar with structure, are not copied from the writings of others, but

are introduced in language of the author's own, having a special value quite apart from the rest of the work. Nor is this all; for the characters are drawn not simply from the complete stage of the insects, but from the larva and pupa as well, and these same stages are introduced in the generic descriptions. It is unfortunate that he has not included also the egg. The work is illustrated so far by ten octavo plates, one of which is devoted to the structure of the wings, the head and legs of the imago; two to the early stages of a few species, and the remainder to excellent chromo-lithographs of the perfect insects. The figures of the early stages are an interesting, though somewhat scanty, addition to our knowledge, the most important of which is found in the larva and pupa of D'Urbania, a curious genus of Lycaeninæ, in which the pupa, as well as the larva, is covered with long fascicles of hairs, as long as the width of the body. Mr. Trimen has been aided by collectors and naturalists throughout Southern Africa to a very great extent, so much so, indeed, that he has added to his title page the name of one of them, Col. Bowker, as joint author with himself; and the help he has received in this respect may be indicated in part by the considerable number of species which have been added to the list of South African butterflies since the publication of his first work, a total of 380 against 197. An excellent coloured map of Southern Africa, south of the tropic of Capricorn, is prefixed to the first volume. We hope the third volume, completing the work, will soon be issued.

SAMUEL H. SCUDDER.

CORRESPONDENCE.

REMEDY FOR ROSE-APHIS.

Dear Sir: Experiments with a weak solution of Creolin upon Rose Aphides and leaf-tying larvæ *(Tortrix)* proved quite successful without any apparent injury to the plants. Rose bushes syringed with Creolin solution remained for some time after free from insects of any kind so far as I could observe. More continued use of Creolin must be made to speak with certainty, but it seems to me likely that in this disinfectant we may have a valuable help for garden or greenhouse.

A. R. GROTE.

Mailed August 1st.

The Canadian Entomologist.

VOL. XX. LONDON, SEPTEMBER, 1888. No. 9

CATALOGUE OF THE MYRMOPHILOUS COLEOPTERA WITH BIBLIOGRAPHY AND NOTES.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Quite a number of our Coleoptera are known to associate in their imago or perfect state with the Formicariæ—comprehensively, ants. Very little, perhaps nothing, is known of the larval and pupal life of any of these beetles. Some, like *Batrisus bistriatus*, probably never leave the ants; but others, like the species of *Cremastochilus*, desert them in the spring, whether afterwards to return and propagate among them is an open question. The association here referred to is common inhabitancy and more or less mutual interdependency, and not mere accidental occurrences under stones, bark and common shelters as seen frequently; and it is not always easy for the collector to avoid confusion of this kind. By bringing together the most of what is recorded in American literature about these interesting Coleoptera, with this as a basis it is hoped a stimulus may be given to research, and collectors may be induced to search for them more diligently, and make public their observations. It is no easy matter to investigate properly an ant's nest, but patience and labour intelligently directed may meet with ample reward. Larvæ and pupæ should be diligently sought for in the formicariums. Only once or twice is there mention of any larva of a Coleopter having occurred with ants, and that of some Staphylinide that may have only been there as an explorer.

ABBREVIATIONS.

Tr.—Transactions of the American Entomological Society.

Pr.—Proceedings of the Academy of Natural Science, Phil. (2nd series).

An.—Annals of the Lyceum of Natural History, New York.

B. J.—Boston Journal of Natural History.

No Carabidæ are known to me to truly inhabit with ants, but several species hibernate in their burrows whether inhabited or not, as *Panagæus fasciatus*, which I find in autumn and in spring.

Ptomophagus parasitus Lec. I take this beetle occasionally in April on the under side of flat stones covering the formicaria of a large black ant *(Formica herculanea ?)*. With this species of ant I once found five specimens of *Hister planipes*, and *Cremastochilus canaliculatus* and *Harrisii* are its guests.

Colon. The Classification, p. 77, states that some species of *Colon* are found only in ants' nests, but I fail to find further bibliography.

Scydmænus. The Classification, p. 84, mentions ants' nests as the residence of some of the species. It might be well for the collector to consider whether the association is other than accidental.

S. capillosus Lec. Is found in March on the under side of stones, and is said (Pr., 6, 152) to sometimes occur in the nest of a small rufous ant with red legs. I take it sometimes with various small ants but just as frequently by itself, and see no connection besides that of occupying a common shelter. Georgia, Pennsylvania and New York.

S. brevicornis Say. Occurs in the nest of a small black ant. New York and Pennsylvania. (Pr., 6, 153.)

S. rasus Lec. Found with a small fuscous ant. Pennsylvania. (Pr., 6, 153.)

Adranes cæcus Lec. Found with a small black ant. June. Georgia and Illinois. (B. J., 6, 84; N. S., p. 28.)

Adranes Lecontei Brend. Several specimens of this curious insect, which is without eyes and has only two joints in the antennæ, were taken by Mr. Charles Dury near Cincinnati, Ohio, with a medium-sized pale brown species of ant, inhabiting a decaying beech log. "On each side of the body and just back of the elytra is a tuft of brown hair, and from it springs a tube from which the beetle exudes a fluid that the ants are supposed to eat."—Dury, Journal of the Cincinnati Society of Natural History, July, 1884.

Ceophyllus monilis Lec. Inhabits here with a medium-sized, honey-yellow ant *(Lasius integerrimus ?)* that nests under stones. When the beetle is found, which is not often, from six to a dozen occur in the same

nest. I find *Hetærius brunnipennis* with this ant. April and May. Dr. Leconte took *C. monilis* under bark in August in Michigan. (B. J., 6, 73; CAN. ENT., 18, 26.)

Cedius Ziegleri Lec. Dr. Leconte took a specimen at Bedford, Pa., in the nest of *Formica rufa*, though previously he had found it under bark. (Tr., 6, 288; B. J., 6, 74.)

Tmesiphorus costalis Lec. Found with *Formica rufa*. (Tr., 6, 287.)

Ctenistes pulvereus Lec. Taken at San Jose, California, "with a small piceous ant with testaceous legs." (An., 5, 214.)

Tychus puberulus Lec. With ants. San Jose, California. (An., 5, 214)

Decarthron formiceti Lec. Found with *Formica Pennsylvanica*. April. Pennsylvania. (B. J., 6, 90.)

Batrisus Ionæ. Found by Dr. Leconte "with a small, opaque, black ant, with rufo-piceous feet and antennæ." May. Mt. Iona, Georgia. (B. J., 6, 94.)

B. armiger Lec. Lives with a medium-sized rufous ant. Pennsylvania. (B. J., 6, 94)

B. ferox Lec. Found with various ants. Pennsylvania, *loc. cit.*

B. cristatus Lec. Found with a large rufous ant with a brownish head. Pennsylvania, *loc. cit.*

B. riparius Say. Occurs occasionally in Pennsylvania under stones with *Formica Pennsylvanica (?)*, but more frequently under pine bark in Georgia. (B. J., 6, 95.)

B. globosus Lec. Inhabits with several species of ant in Pennsylvania and Georgia. (B. J., 6, 100.)

B. bistriatus Lec. Taken by Dr. Leconte with a large rufous ant, *loc. cit.* I have taken it twice in April with a medium-sized honey-yellow ant. The ants seem to be very fond of them, and carry them off like their eggs and pupæ, while the beetles appear to be entirely impassive. (CAN. ENT., 18, 26.)

B. lineaticollis Aube. Taken with a large rufous ant. Georgia and Pennsylvania. (B. J., 6, 100.)

It is quite probable other species of this genus occur with ants. Five species in California, described as new by Mr. Casey since the catalogue

was issued, are found in wet moss and under stones near water courses, thus showing great diversity of habit in insects placed in the same genus.

Anchylarthron cornutum ♂ *(inornatum* ♀*)* Brend. Gregarious with ants. Mississippi Valley and South Carolina. (Tr., 14, 208.)

Trimium puncticolle Lec. Many specimens of this species were taken in an ants' nest by Dr. Horn in Arizonia. (Proc. Am. Phil. Soc., 17, 384.)

Homalota. An undescribed species was taken with *Formica rufa* at Bedford, Pa., by Dr. Leconte. (Tr., 6, 288.)

Lomechusa cava Lec. About fifty specimens were taken with a colony of black ants [*Formica Pennsylvanica*] inhabiting a white oak log. Massachusetts. (Bul. Brook. Ent. Soc., 2, 4.) Dr. Leconte took it from the mounds of *Formica rufa* in the Alleghany Mountains; it occurred with yellow ants in Columbia County, Pa., Michigan and Maryland; and in Illinois in large numbers in the nests of *Formica rufa (?).* (Tr., 6, 287.)

Oxypoda. A species occurred with *Formica rufa* at Bedford, Pa. Leconte. (Tr., 6, 288.)

Leptacinus longicollis Lec. Occurs in the middle States, and usually in ants' nests. (N. S., p. 41.)

Eleusis pallidus Lec. Ants' nests, Lancaster County, Pa. (Leconte in New Species, p. 58. This insect is gregarious. I have twice taken a colony early in July under the bark of Balm of Gilead stumps *(Populus candicans)*—once with very small brown ants, and once alone. The association of this species with ants appears to me to be merely accidental. (CAN. ENT., 18, 27.)

Hister planipes Lec. Occurs, according to Dr. Horn, from Massachusetts to Georgia. Here, I took once five specimens in April in a nest of *Formica herculanea.*

H. perpunctatus Lec. Mr. F. Blanchard takes this species at Tyngsborough, Mass., with a brown ant, 4.5 mm. long. (Tr., 8, 190.)

H. repletus Lec. This, according to Mr. Blanchard, is also found in Massachusetts in the nest of a small black ant. (Ent. Am., 3, 86.) It is quite probable *H. subopacus* is also a Myrmophile. It occurs in Nebraska, Colorado, and also in Vancouver Island.

Hetærius brunnipennis Rand. Occurs here occasionally with a medium-sized honey-yellow ant in April and May.

H. Blanchardi Lec. Mr. Blanchard, the discoverer of this species, took it and *Hister perpunctatus* with the same species of ant. (Tr., 8, 190.)

Echinodes setiger Lec. This singular form has occurred variously; in South Carolina and Georgia with a pale ant. (Horn. Proc. Am. Phil. Soc., 13, 305.) Zimmerman found it at Columbia, South Carolina, in April, with a small brown ant. (Tr., 2, 253.) And it has been taken in Habersham County, Georgia, in the nest of a small ant under bark. (Pr., 1859, 316.)

Cremastochilus Schaumii Lec. Dr. Horn frequently found this species in ants' nests in California. (Tr., 3, 339.)

C. Westwoodi Horn. Found in or near ants' nests in Owen's Valley, California, where it is not rare. (Pr. Am. Phil. Soc., 18, 139.)

C. angularis Lec. This species was taken frequently in ant's nests in California by Dr. Horn, who several times saw large black ants dragging the beetles towards their nests. He strongly suspects the fossæ at the anterior angles of the thorax and the finely punctured and perforated patches under the hind angles yield a secretion grateful to the ants. This species extends to Vancouver.

C. variolosus Kirby. One specimen occurred here with ants.

C. canaliculatus Kirby. Is the most abundant species found here; it is found from April till June with large black ants, perhaps of two species, inhabiting usually under stones or other covering, but not infrequently throwing up small mounds in old pastures and open ground. The nests under stones rarely yield more than two beetles, but the mounds often contain five or six at once, and with care will yield a crop every two or three weeks. The beetles are found near the surface, none having been taken below the plane of the base.

As soon as it becomes warm, from the middle of April onward, this species takes leave of the ants and flies away; like the *Cicindelæ* it only flies during the hottest sunshine and for short distances, alighting suddenly on a stone or the middle of a dusty road. Its flight is low and heavy, and after it lights cannot take wing again without some delay, and I have seen it flying as late as August. Whether after having left, the same beetles

return and breed among the ants, or whether it is a new brood that claims their hospitality for the winter, is absolutely unknown. I never could satisfy myself as to whether those found in the nests in June had returned or were just preparing to leave. (For some interesting observations on this species and *Schaumii* see Ent. Am., 1, 187.)

C. Harrisii Kirby. I neglected to observe the ant with which I took a specimen.

Dr. Horn incidently mentions that *C. leucosticticus*, *pilosicollis* and *castaneæ* have likewise been observed in ants' nests. (Pr. Am. Phil. Soc., 18, 384.)

Without much doubt many species of our *Staphylinidæ* will be found to be Myrmophilous as in Europe, where, according to Rev. J. G. Wood, in the Aleocharidæ alone no less than "eight genera contain species that are parasitic and spend their whole lives in the nests of ants," among them *Atemeles emarginatus* and *A. paradoxus* living with *Formica fusca* and *Myrmice ruginodis*, which take as good care of them as of their own young; also *Myrmedona Haworthii* and *Dinarda dentata*, *Quedius brevis* is said to live with *Formica rufa*, and that wonderful beetle *Claviger foveolatus*, destitute of eyes and mouth, inhabits with *Formica flava*.

Besides the species catalogued here several others in our Fauna are traditionally reputed to dwell with ants, but the observers have either not published the facts or I have failed to find the bibliography.

THE CLASSIFICATION OF THE BOMBYCIDÆ.

(Second Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

We have seen, CAN. ENT., xix., p. 156, *et seq.*, that the Bombycidæ, or Spinner Moths, are characterized, as a whole, by their short, pectinate antennæ, ample, velvety wings, thick bodies, small heads and sluggish habit, while the pupa is usually contained in a cocoon made by the caterpillar in its last stage. To almost all these characters the sub-family groups offer exceptions, and we have seen that while Dr. Packard follows the tradition of Harris, Latreille and Linnaeus, modern German writers break up the family into independent groups limited by structural features

taken from the imago. What Agassiz calls "form" still unites these various groups—a certain correspondence in outline and habit. Dr. Packard seeks this in the shape of the clypeus, the piece between the eyes, its relative proportion. In my first paper I have adopted this view, that we have to do with descendants of a former complex and that we may still unite the Spinner Moths under a common family title. Those who differ may merely alter my sub-families into families.

Sub-family *Sarothripinæ.*

The single genus *Sarothripus* Curt. was first referred to the Tortricidæ, then to the Noctuidæ, and finally as part of the *Nolinæ*, the second sub-family or group of the Bombycidæ. In my new Check List the genus is omitted, as I had no knowledge of our N. Am. species. The form of the cocoon allies it to *Nola.* The moth is tortriciform and differs from *Nola* decidedly in the form of the wings. The fore wings are elongate, sub-quadrate, hardly widening outwardly with acute apices. The palpi are much longer than the head, more erect and prominent than in *Nola.* The caterpillar is 16-footed and makes a boat-shaped cocoon. The neuration shows a relation to *Nola* and the Lithosians. As the hind wings have only two internal veins, we see that the moth is not really a Micro, to which group it was once referred. The fore wings have no accessory cell. We shall come back to this accessory cell later and show its importance and constancy in some other groups. The antennæ are simple in both sexes. The resemblance to *Nola* lies also in the want of ocelli, and this character unites the three first groups, viz., *Sarothripinæ*, *Nolinæ* and *Lithosiinæ;* again, the elongate palpi, which are, however, equally squamous throughout. Of the European genera, *Chlœphora*, *Halias* and *Earias*, we have no N. Am. species, and these probably form a distinct group, *Chlœphorinæ.* Of *Sarothripus* we have one described from the East and one from the West. Now the European species is very variable, and whether we have more than one species, or whether our species is really distinct from the European *revayana*, is not clearly made out. Probably the earliest descriptions of forms of our Eastern *Sarothripus* are those cited by Fernald, Am. Ent., I., 36, the *Tortrix scriptana* and *frigidana* of Walker.

Sub-family *Nolinæ.*

The fore wings are broad, sub-trigonate, without accessory cell; the hind wings rounded, not as in the *Sarothripinæ*, with the outer margin

indented. No ocelli. The fore wings have tufted scale patches above. The caterpillars are 14-footed and make a boat-shaped cocoon. The neuration of our N. Am. genus *Argyrophyes* is given by me, CAN. ENT., ix., 236; and we have two species, *cilicoides* and *nigrofasciata* (= *Eustrotia obaurata* Morr.). This latter synonym recalls the fact that the ornamentation in this group of small insects resembles that of the Noctuidæ. In *Argyrophyes* the raised blotches of scales on primaries are metallic. Of the typical genus *Nola*, I have cited five N. Am. species in the new Check List.

Sub-family *Lithosiinæ*.

The long palpi of the preceding groups are replaced by shorter, more bombyciform appendages. In this group the body is weak and the fore wings usually narrow, while the hind wings are wide and frail. The ocelli are wanting. Hence I refer *Crocota* to the following group of *Arctiinæ*. The costal vein of secondaries springs from the subcostal. No accessory cell on primaries. The caterpillars are 16-footed and live on lichens. In the new Check List I cite the genera *Clemensia*, *Crambidia*, *Hypoprepia*, *Cisthene*, *Byssophaga* (distinct?), *Lithosia*, *Euphanessa* and *Ameria*. It is possible that the two last do not belong to this group.

Sub-family *Arctiinæ*.

In this group the male antennæ are usually provided with short pectinations; the ocelli are present; the palpi are quite short and the whole appearance is bombyciform. Veins 4 and 5 are near together on both wings. The moths are usually of larger size than in the preceding groups; the wings are ample, held roof-like in repose. The caterpillars are hairy and make loose cocoons. Our North American genera are allied to the European, but Dr. Packard has drawn attention to the fact that onr species are more white and yellow, less red-colored than the European. In the presence of the genus *Nemeophila* the west coast fauna more nearly resembles the European. The genera *Crocota*, *Kodiosoma*, *Seirarctia*, *Leucarctia*, *Ecpantheria*, *Euerythra*, *Halisidota*, are more especially American forms, outgrowths, so to speak, of *Spilosoma* and *Arctia*. I wish to correct here Mr. J. B. Smith's reference of *Cerathosia tricolor* Sm., to the *Arctiidæ*. A comparison of its corrected characters will show that it should be rather referred to the *Noctuidæ*. The clypeus has an inferior circular rim and presents a sub-central, button-

like projection. This is a Noctuid and Pyralid feature, though a projection is found in *Copidryas* without the rim. The fore wings have an accessory cell. The hind wings have vein 5 present, but weak, not absent as stated by Mr. J. B. Smith, and this vein is equidistant between 4 and 6, contradicting the characters of the *Arctiinæ*. Mr. J. B. Smith also describes incorrectly the relative positions of veins 3, 4 and 5 on primaries, as also the point of emergence of vein 10, which springs from about the middle of the upper margin of the accessory cell, not from the upper and outer angle of the cell, whence springs vein 7, giving off 8 and 9. In *Ceratosia* there is a claw on fore tibiæ; the legs are thinly scaled, the palpi not so short as in the *Arctiidæ*. The moth is lithosiform rather than arctiiform in appearance, but the ocelli will not allow of its being referred to the Lithosians; its neuration and total characters exclude it from the Bombycidæ altogether. The squamation is rather like *Tarache* than like *Arctia*. It is not enough that a description of a genus be given; the reason *why* it belongs to the family must be stated. Added to this, Mr. Smith's description is in itself faulty and inaccurate, and affords no reason why this author should use such language in correcting Mr. Hy. Edwards's reference of certain genera, or take such a tone in correcting my own writings. In the present day when the Lepidoptera are well known, the details of structure of the different groups are all given in the writings of the past fifteen or twenty years in Europe and America.

Sub family *Dasychirinæ*.

This group is allied to the *Arctiidæ* by the tufted or shaggy caterpillars, the frail cocoons. The antennæ are more plumose, in the female with short teeth. The palpi are short. The ocelli are again wanting. The legs are short and are usually hairy as in many of the *Arctiidæ*. The pupa itself is often hairy—an unusual character. The wings are ample, but in the females of some genera wanting or incompletely expanded. Veins 4 and 5 spring near together, another point of resemblance to the *Arctiidæ*. In fact we cannot but approve of Harris's and Dr. Packard's arrangements of these groups. *Hepialus* and *Cossus* should not be interpolated here, but are the lowest groups of the family. In the *Dasychirinæ* the body is rather heavy, and there is a disproportion between the sexes, many males being much smaller and lighter. In the New Check List I have cited the N. Am. genera *Parorgyia*, *Carama*

and *Lagoa*. The two latter are curious, and show some resemblances to the following group, *Cochlidiinæ*. *Carama* may be described by Curtis also. The genera *Orgyia* and *Dasychira* are shared with Europe; in the old world the representation of the *Dasychirinæ* seems to be far greater than in the new.

PARTIAL PREPARATORY STAGES OF CATOCALA INNUBENS, GUEN.

BY G. H. FRENCH, CARBONDALE, ILL.

April 28, 1887, a single larva of a then unknown Catocala was found on a Honey Locust which proved to be this species. By its appearance it had seemingly passed the first moult. Hence the egg and first stage of the larva is lacking in this account of its life history. If my conjecture be true, my description will begin with the conventional "after the first moult." Length, .26 inch. Color pale greenish, the anterior two and posterior three joints whitish; four purplish red stripes on each side, the lower somewhat broken; head mottled, but not heavily so; piliferous spots black, with short black hairs. Shape as usual with Catocala larvæ. Duration of this period unknown.

After 2nd Moult.—Length, .40 inch. Color, pale dull purplish rose in nine longitudinal stripes alternating with pale greenish white lines, the rose darker on the head and joint 2, shading into the pale rose on joint 3; the dorsal stripe a narrow line on joints 2 to 4, broken between the joints and narrow on the last three joints; stripe 2 (counting the dorsal one) contains the dorsal piliferous spots; stripe 3 without any piliferous spots; stripe 4 with the lateral piliferous spots; below this a broken and irregular stripe that contains the lowest piliferous spots. These stripes are of the double line kind, each edge darker than the middle, though there is little difference in any of them except the lowest or number 5, which has more or less of the greenish white in its centre. Piliferous spots black, conspicuous, the short hairs black; head reddish purple with mottlings of broken white lines. Duration of this period four days.

After 3rd Moult.—Length, .80 inch. Color, pale green, with seven dark reddish purple stripes on each side, composed of contiguous dots; head striped with purplish black and white; the dark on joint 2 black,

gradually shading into the purple; yellow tinted between the joints; piliferous spots black; joints in the middle of the body with black patches on the venter. The posterior pair of piliferous spots on the dorsum of joint 9 are, like other species, more approximate than the others and the intervening space elevated, the elevation containing four spots in a transverse row with a patch of pale yellowish back of these. Duration of this period five days.

After 4th Moult.—Length, 1.20 inches. Color, pale green, almost white, with a slight yellow tinge, more distinct underneath the top of joint 2, the legs and a substigmatal stripe distinct yellow; the transverse folds between the joints with more of the yellow tinge. Head striped with dark reddish purple (this was black before) and white, the markings arranged as before but the stripes are almost obliterated on the body except on joints 2 to 4, and the transverse folds between the joints where they are distinct as to the rows of black dots that mark the boundary of the stripes, faint traces of these on the middle of the joints; the black on the venter small except on the middle joints. Piliferous spots black, not very large; a prominent black patch on each side of the posterior part of joint 9, composed of three spots, a short dorsal orange line between them; the posterior pair of spots on the back of joint 12 more prominent than the others; no lateral fringe, but a slight fold above the pro-legs; the anterior two pairs of pro-legs pretty well developed.

Mature Larva.—Length, 2.25 inches. Color, sordid white, a little green tinted, very obscurely striped as at the beginning of the stage, the bordering blackish dots marking the boundary of the stripes most distinctly on the intersegmental folds; the black on joint 9 the same as before with a very short orange stripe between; the substigmatal pale stripe orange on joints 5 and 6; joints 2 to 4 with the rows of spots distinct. Piliferous spots small, black; venter white, tinted a little with yellow, black only on the joints bearing feet; no fringe. Duration of this period nine days.

Chrysalis.—Length, 1.05 inches; diameter, .40 inch; of joint 5, .30 inch; tapering from joint 5 to the end; rather strongly indented on joint 1; tongue and wing cases equal, extending back to posterior part of joint 5; cremaster two long hooks at the tip, two shorter at the base, outside of these and a little removed from them several other short hooks; abdominal joints slightly punctured, the tongue and wing cases shallowly corru-

gated, terminal joint deeply on dorsal and lateral parts; head rounded. Color, chestnut brown, as usual coated with a white powder. Puparium a slight lining to the leaves that were fastened together with silk.

The larva pupated May 17th, and the imago appeared June 20th, giving a pupal period of about a month, which is about the same as the other species that have been bred. One feature of the species is that the larva has no lateral fringe. As given before, the food plant is Honey Locust.

May 12th, another larva was found that differs from the above description only in being darker, and as a natural result the stripes more distinct, the light stripes having an orange tint. After this two more were found, one of which had all the light stripes quite distinctly orange tinted. The head was reddish purple striped with numerous white lines, or rather broken lines. Like the other, the venter had the black only on the joints bearing legs. This one had passed the last moult when found, and produced the imago June 17th, showing that keeping the first in confinement had not materially interfered with its time of pupating or its other changes.

ON THE CHALCIDEOUS TRIBE CHIROPACHIDES.

BY WILLIAM H. ASHMEAD, JACKSONVILLE, FLA.

Below I give an analytical table for recognizing the genera in the tribe *Chiropachides* Thomson. It will be seen that I have placed in this group the genus *Schizonotus* Ratzburg, which Dr. Arnold Foerster, in his Hymenopterologische Studien (1856), says is identical with *Seladerma* Walker, an opinion in which I cannot concur, my type of *Schizonotus Siebaldi* Ratz. not agreeing at all with Walker's definition; also the genera *Mesopolobus* and *Platymesopus* Westwood, which were subpressed by Walker and other authorities, and placed in the genus *Pteromalus;* they agree in all essential characters with this group, the anterior femora being very similar to *Chiropachys*, the type of the tribe.

Two new genera will be found characterized in this group, the characters of which, as given in the table, being sufficient, it is hoped, to enable them to be easily recognized.

The arrangement proposed is as follows :—

Tribe *Chiropachides* Thomson:

TABLE OF GENERA.

Posterior tibiæ with one spur 3
Posterior tibiæ with two spurs.
Eyes not hairy 2
Eyes hairy.
Abdomen sessile, long pointed ovate, marginal and postmarginal veins somewhat thick, the latter being longer than the marginal; stigmal vein short, one-third the length of the marginal; sculpture coarsely pitted ..... *G. 1, Dasyglenes* n. g.

2. Collar transverse quadrate, separated from the mesothorax by a deep incision at the posterior angle; pedicel of antennæ lengthened, funiclar joints much broader than long, the club obliquely truncate from below ..... *G. 2, Schizonotus* Ratzburg
Collar not so formed.
Collar transverse, rounded before, narrowed in the middle.
Anterior femora exciso-dentate; wings with two transverse bands .....
..... *G. 3, Chiropachys* Westwood.
Anterior femora simple; wings with one transverse band .....
..... *G. 4, Acrocormus* Förster.

3. Abdomen petiolated 6
Abdomen sessile, long or pointed ovate.
Marginal vein of anterior wings not thickened 5
Marginal vein of anterior wings thickened.
Antennæ with transverse ring-joints 4
Antennæ with ring-joints large not transverse.
Marginal vein but slightly longer than the stigmal .....
..... *G. 5, Pandelus* Förster.

4. Stigmal vein and postmarginal vein short .... *G. 6, Metacolus* Förster.
Stigmal vein longer than the marginal; ♀ with the antennal joint stylate at the apex ..... *G. 7, Raphitelus* Walker.

5. Parapsides only indicated anteriorly; anterior margin of collar sharp.
Stigmal club very large ..... *G. 8, Dinotus* Förster.
Stigmal club small or moderate.

* ♀ With marginal vein at least thrice as long as stigmal; funiclar joints broader than long; middle tibiæ in ♂ with a small hirsute lobe, outwardly near tip.... ..... *G. 9, Mesopolobus* Westwood.

** ♀ With marginal vein not twice as long as stigmal; anterior tibiæ flat; middle tibiæ in ♂ broadly dilated, foliaceous.....
..... *G. 10, Platymesopus* Westwood.

6. Collar rounded before; mesothorax lengthened with three keels. Marginal vein more than twice longer than the stigmal; parapsides indicated anteriorly..... *G. 11, Rhopalicus* Förster.

Marginal vein but slightly longer than the stigmal; parapsides complete
..... *G. 12, Brachycrepis* n. g.

Dasyglenes n. g.

♀ Whole surface, including the abdomen, very coarsely reticulato-punctate, and sparsely covered with a pale pubescence. Head large, slightly broader than the thorax with deep antennal grooves, the grooves converging and meeting at apex. Antennæ inserted slightly above the clypeus, the latter with a sinus in the middle. Eyes hairy. Collar transverse, contracted and produced anteriorly into a short neck, the neck with a delicate medium carina. Mesothoracic parapsides delicate but complete. Scutellum convex, as broad as long, slightly prolonged over the metathorax and ending in a slight projecting ridge at the apex. Metathorax short, with a delicate medium keel. Abdomen sessile, much longer than the head and thorax together, acuminated, the tip projecting slightly beyond the wings when folded. All femora swollen, the fore pair much more so than the middle pair; the tibiæ are very long, the three basal joints of which are as long as their tibiæ; the middle and posterior tibiæ longer than their femora, and the tarsi not nearly as long as their respective tibia; the posterior tibiæ are armed with two strong, divergent apical spurs. The submarginal vein, of anterior wings, is one and a-half times as long as the marginal, the marginal and postmarginal veins thick, the latter much lengthened, gradually acuminated, ending at the rounded edge of the apical margin of wing; stigmal vein short, about one-third the length of marginal, slightly bent, the stigma small and slightly emarginated at the apex. ♂ Unknown.

Dasyglenes osmiæ n. sp.

♀ Length .25 inch. Cyaneous, coarsely pitted, pubescent. Flagellum of antennæ brown. Legs dark red, pubescent; femora infuscated. Wings

hyaline, veins brown; the whole surface is covered with a fine brownish pubescence. Described from one ♀ specimen reared from a bee, *Osmia* species, living in Catalpa twigs.

This genus shows strong affinities with *Cleonymus* Latreille and *Aetroxys* Westwood, but is readily distinguished from both by the thickened fore femora; had it not been for this character I should have placed it in the genus *Cleonymus*.

Chiropachys Westwood.

Chiropachys colon Linn., Faun. So. Ed., ii., p. 413; *C. quadrum* Walk., Ent. Mag., iv., p. 14; *Pteromalus bimaculatus* Swederus.

This common European chalcid must now be added to our fauna, specimens having been taken in the United States that cannot be separated from types received from Europe.

The species described by Mr. Edward Norton as *Chiropachys nigrocyaneus*, Trans. Am. Ent. Soc, ii., p. 327, is not a *Chiropachys*, but belongs to the genus *Pachyneuron* in the tribe *Sphegigastrides*.

Dinotus Förster.

Dinotus elongatus n. sp.

♀ Length .13 inch. Dull metallic brown, confluently punctate, sparsely covered with white hairs. Head much wider than the thorax, the width of the vertex nearly twice the length of the eye. Ocelli red, Eyes ovate, brown. Antennæ 13-jointed, filiform, pubescent, the long slender scape, pedicel and the two ring-joints, honey-yellow; flagellum brown, the first funiclar joint the longest, following joints slightly subequal; the club short, three-jointed, slightly thicker than the funicle, and not longer than the first funiclar joint. Collar very short, transverse; parapsides only indicated anteriorly. Metathorax not very long, not keeled; metathoracic spiracles long oval; metapleura slightly pubescent. Coxæ smooth, bluish-green, with tufts of white hair anteriorly. Legs honey-yellow, excepting the femora which are brownish in the middle. Abdomen sessile, pointed ovate, one-third longer than head and thorax combined, concave above, and of a dull greenish metallic lustre, each segment laterally with some short hairs. Wings hyaline, sparsely pubescent; veins yellowish, the marginal hardly twice the length of the stigmal, the latter terminating in a slight knob, while the postmarginal is slightly shorter than the marginal. Described from one specimen captured at large.

Brachycrepis n. g.

This genus is very similar to *Rhopalicus* Förster, but the prolonged metathorax has three distinct keels, the abdomen has a short rugose petiole, the marginal vein of the front wings is but slightly longer than the stigmal and the parapsides complete. The anterior femora are very much swollen ; the antennæ are subclavate, 13-jointed with two ring joints, and are inserted slightly below the middle of the face ; the pedicel is about as long as the first funiclar joint.

Brachycrepis tricarinatus n. sp.

♀ Length .13 inch. Dark blue with a slight metallic tinge on the head and thorax, confluently punctured. Eyes dark brown. Antennæ 13-jointed, black, except the scape beneath, which is brownish-yellow ; flagellum pubescent ; the first funiclar joint the longest, the others slightly subequal, but gradually growing wider toward the club, the fifth and sixth joints being wider than long. Collar transverse, narrowed in the middle. Mesothoracic grooves distinct, but very delicate as they approach the scutellum. Coxæ, femora and tibiæ, excepting their tips and the last tarsal joint, blue-black ; tips and the other tarsal joints, honey-yellow. Abdomen long ovate, about the length of the thorax, blue-black with a very slight metallic tinge near the base beneath. The second segment, counting the petiole as the first, is the largest, the others gradually subequal ; each segment with a single row of delicate white hairs. Wings hyaline ; veins pale brownish, the submarginal vein as long as the marginal and postmarginal together, delicate, the marginal is but slightly longer than the stigmal, the latter clavate with a slight uncus.

Hab.—Riley Co., Kansas. Prof. E. A. Popenoe.

CAN INSECTS DISTINGUISH BETWEEN RED AND YELLOW?

BY T. D. A. COCKERELL, WEST CLIFF, COLORADO.

In this neighborhood (Custer Co., Colorado,) one very frequently finds a yellow spider of the genus *Thomisus* or allied thereto, seated in the middle of the umbels of *Ligusticum montanum* Benth. and Hook., and on other yellow flowers. This spider, so seated, has nothing to cover it from direct observation, and from its size and colour would be conspicuous enough elsewhere ; but on the yellow flower, sitting in the depression in

the centre of the umbel, it is quite invisible unless specially looked for. Thus concealed, it waits until some insect—frequently a small bee, or a butterfly of the genus *Pamphila*, settles on the flower—but no sooner is the insect intent upon the nectar of the blossom, than the cunning *Thomisid* has it in its grasp, and is sucking its life-juices away. On one occasion, also, I found a white *Thomisid* spider seated on a white umbel, and equally concealed here by its whiteness, it had secured and was feasting on a bee. So far good. It may be argued that spiders of this family have been accustomed to sit on flowers, and being variable in colour (as in fact they are) natural selection has so arranged matters that yellow spiders preside over yellow flowers, white over white, and so on. But perhaps, also, the spider has "an eye for colour," since he (the yellow one) occasionally sits on a small species of sunflowers which has yellow rays and a dark brown disc—and here, although the spider always sits in the *middle* of a yellow umbel, he sits on the *rays* of this sunflower, knowing altogether better than to expose himself to observation on the brown disc. But, to come to the point to be discussed, there is a species of geranium found here *(Geranium fremontii* Torrey,*)* having *pink* flowers—yet the *yellow* spider sits on these, apparently unconcerned at the difference of colour. Now, it is a curious thing, that throughout living organisms, whether birds *(e. g. Fringillidæ)*, mollusca *(e. g. Tellinidæ, Helicidæ)*, insects *(e. g. Zygænidæ, Sesiidæ, Cheloniidæ, Ichneumonidæ)*, or plants, that the red and yellow pigments seem to stand in this relation to one another that the red is a more complex form of the yellow, and hence occasionally reverts to it, yellow being in all cases the primitive color. In *Geranium*, it is true, there are not (to my knowledge) yellow-flowered varieties, but then, there are both pink and yellow-flowered species of *Oxalis*, in the same natural order. Therefore, it is conceivable that the yellow *Thomisid* first came to sit on geranium flowers at the time when these were yellow, and has continued the habit—but still, since it appears to understand the difference between brown and yellow on the sunflower, why cannot it tell that pink and yellow are not the same? Does it not look as if, to this spider, these colours were indistinguishable?

Also, the geranium-frequenting spiders do not starve, although to human eye they are very easy to be seen—does not this, again, look as if the insects frequenting those flowers could not distinguish between pink and yellow, and so, not seeing the spider, fell unwittingly into its grasp?

This is the question I wish to ask, and to answer it, it is necessary to have observations of a more extensive nature on the relation of yellow insects to pink flowers, and *vice versa*. I have myself noticed that (in Kent, England,) *Gonepteryx rhamni* appears to be exceptionally fond of settling on pink flowers, but it seemed to me rather that the butterfly was conscious of the contrast between the colours and its own conspicuousness arising therefrom.

May I rely upon your readers to supplement these notes, and so clear up this question?

CORRESPONDENCE.

DICERCA PROLONGATA.

With reference to Dr. John Hamilton's note on p. 120, I may say that I have found the larva of this species boring in *Populus tremuloïdes* in Colorado, concerning which details were published in the "Entomologists' Monthly Magazine" for March, 1888, vol. xxiv, p. 232-233.

T. D. A. COCKERELL.

CAPTURES IN 1887.

Dear Sir: My additions to the list of Canadian Lepidoptera for the past season is of the most meagre description. I took a good many micros, new to me; but as usual, with them a large proportion were single specimens of a kind. I sent to Prof. Fernald 17 specimens which I had in duplicate; of these three turned out to be variations of kinds that he had previously named for me; three proved to be all one; one, *Depressaria heracliana* Dege. was new to me, but already in the list, and one *Eccopsis nitidana* Clem. is new to the Canadian list; the rest were unknown to him. Three years ago I captured at Ridgeway, along with Limacodes, to which I thought it belonged, a moth new to me, and which has been from that time until lately awaiting a name. During the past winter, Mr. Johnston, of this city, was making some exchanges with Miss Emily L. Morton, of Newburgh, N. J., and received from her a specimen labelled *Adoneta spinuloides* H. S., in which I recognized my unnamed Bombycid. Miss Morton acknowledges her indebtedness to Mrs. Fernald for the correct identification of most of her Lepidoptera. On the 11th of July last I came on an assemblage of Pyralids in the grass under the shade of a butternut tree, where I had taken refuge from the excessive heat. At first

I thought it was *Botis magistralis*, on closer inspection I doubted its identity—it was like, and yet unlike. I concluded that if it was *Magistralis*, it was an unusually fine specimen, so I took a quantity of it anyway, and all the more willingly as it was quite abundant in the very spot where I wanted to stay for a while. On comparing them, I was still undecided; whilst in communication with the Rev. Mr. Hulst, about some Geometers, I sent to him a specimen and received for it the name *Botis quinquelinealis* Grote. These three names are then the only presentable result of my last season's work in this direction.

J. Alston Moffat, Hamilton, Ont.

KNOWLEDGE OF DEATH IN INSECTS.

Dear Sir: An incidental remark in one of my papers, page 6, of the present vol., has attracted the attention of a correspondent of the Entomologist, as may be seen by turning to page 120. I was then entirely unaware that I was meddling with an "*ipse dixit* of Mr. Grote's, or was touching one of his 'chips,'" but, in common with the readers of the Entomologist, I know it now. While Mr. Grote certainly had the right to show, if he could, that the alleged assertion, whether made by himself or not, was not "unsupported," was not "dogmatic;" yet he had no right to assume that I had seen his paper, and even on that assumption no right disposed person, while differing from me, could take legitimate offence at my words, which are strictly scientific. The cause is said to be weak, when the advocate resorts to the *argumentum ad hominem* to overcome his opponents *argumentum ad rem;* * * * Let us see where Mr. Grote stands, his words are: "It is by *the keeping still* that the insects seem to me to appear to 'feign death,' of the existence of which latter they could have no knowledge." Few or none will dispute the first part of the quotation. It states exactly what such insects do, that is, "keep still;" but this does not prove that insects can have "no knowledge of death;" no proof of this is anywhere offered, nor is the assertion in any way limited or qualified; hence "unsupported," "dogmatic" are appropriate adjectives, and though not made by me with any reference to or knowledge of Mr. Grote's paternal claim. Now see how he "corrects" the adjectives "unsupported," "dogmatic" (ib, p. 120). His words now read: "Whether insects can have any knowledge of death, as such, may be a matter of opinion," etc., quite a different statement from his former

postulate, that insects could have no knowledge of death. The reader will notice how *ingenuously* "dogmatic" is disposed of by this change of base. Now, as to what he doubts not is the main point, that is, "the keeping still," that is only what these insects do, a mere act, and one to which even Mr. Grote himself attaches a motive, "the approach of danger." But why "keep still" on the "approach of danger"? His answer cannot be surmized. Writers have expressed various opinions about this "keeping still," "death mimicry," "feigning death," as practiced by certain insects and other animals, but I have not seen any statement that they can have no knowledge of death, except that claimed by Mr. Grote and a similar one in a Pittsburg newspaper. Dr. Lindsay, in his work "Mind in Animals," in treating of death-feigning, says: "This must require great self-command in those that practice it;" while Professor James, of Harvard College, in an article in Popular Science Monthly, June, 1887, on "Some Human Instincts," says: "It is really no feigning of death at all and requires no self-command. It is simply a terror paralysis, which has been so useful as to become hereditary." In commenting on this the newspaper man makes the remark I took exception to, my notice of which, without at the time being able to state where I had derived it, brought out Mr. Grote, whom I would most assuredly have quoted had I been aware of his assertion.

JOHN HAMILTON, Allegheny, Pa.

ARZAMA OBLIQUATA, G. AND R.

Dear Sir: In reference to Mr. Moffat's remark in the July number of the CANADIAN ENTOMOLOGIST, that the larva of this moth does not always form its pupa in the reed, I wish to say that I have taken between fifty and seventy-five chrysalids this spring, and all of them were in the reeds where the larva had been feeding. I believe that the larva sometimes goes out of the reed and wanders in other directions before going into pupa, but this is not often the case. My friend, Mr. Doll, when breaking an old cedar stump apart last spring, found in it the chrysalis of *A. obliquata*, but the larva had been feeding in the stump. Could that have been the case in Mr. Moffat's instance?

HERMANN H. BREHME, Newark, N. J.

Mailed September 1st.

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THE CLASSIFICATION OF THE BOMBYCIDÆ.

(Third Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Sub-family *Cochliinæ.*

A study of the American genus *Lagoa* in its various stages of growth shows a manifest approach to the present group, so that we are warranted in following the *Dasychirinæ* with the *Cochliinæ.* This sub-family is remarkable for its peculiar larvæ, called "slug caterpillars" or "saddle-backs." The first name is given on account of their snail-like appearance, the form being elliptical or oval, the false feet replaced by swellings on the abdominal segments, so that the larva lies flat and close to the leaf. The head is also retractile. The cocoon is egg-shaped or circular, firm and spun between the leaves. The moths are not unfrequently green and brown as are the larvæ, and the name "saddle-backs" is given in allusion to the bright green quadrate patch which covers the back in some species. Dr. Packard calls one species *monitor*, in allusion to the singular shape and armature of the larvæ. The moths are of various shades of brown, often with green patches, sometimes with darker lines and shades on primaries. The ocelli are wanting and the tongue is short. The North American genera fall into two series: one in which the male antennæ are pectinate, the other brush-like or sub-simple. To the first series belongs the typical genus *Limacodes* of Latreille, and to this series belong the two European species representing two distinct genera. As compared with Europe, our fauna is rich in *Cochliinæ.* We have two species belonging to the Asiatic genus *Parasa*, with grass-green thorax, and the fore wings largely green. The larva of *Parasa chloris* H.-S., is described by Mr. Henry Edwards, Papilio iii., 128; that of *Parasa fraterna* Gr., by the same author, Ent. Amer. iii., 169. (I here correct a statement of mine, that the sub-family *Chloephorinæ* does not occur in North America. Mr. Henry Edwards describes *Earias obliquata* from Florida, a form unknown

to me, the genus belonging to this sub-family which I distinguish from the *Sarothripinæ*) I do not know any forms of *Cochliinæ* from California; if the sub-family is feebly represented there, it will be a fresh example of the resemblance between the West Coast fauna and the European. No Cuban forms were included in the collection described by me. The geographical distribution of the North American Bombycidæ merits attention. On the islands of the West Indies, there seem to be no typical Spinner moths, that is to say, no *Attacinæ*, *Ceratocampinæ*, *Platypteryginæ*, *Lachneinæ*. In the new Check List, I included the only West Indian form of this group known to me, *Heuretes picticornis* G. & R., the types of which are in the Royal Museum in Berlin. Fifteen other genera are included in my list, and although one or two of these are probably synonyms, not being identified by me, enough is shown to prove the richness of our fauna in this group. Sepp figures a South American species of *Empretia*. The group is probably widely distributed and belongs to the older forms of the family.

Sub-family *Psychinæ*.

The larvæ of the present group are still more curious than those of the *Cochliinæ* from their habit of living in a case. The thoracic feet alone are developed, and the undeveloped abdominal feet present a resemblance to the slug caterpillars, so that we have a reason for bringing the groups together. The cocoon-making habit is not alone displayed by the mature larvæ, for so soon as the little Psyche larva leaves the egg it fashions a tiny sack and begins its wanderings, dragging its shelter after it. In most of the genera, the females are apterous and worm-like, but in the North American genera with broad, falcate wings, *Perophora* Harris, and *Lacosoma* Grote, the females are winged like the males. Sepp figures a South American broad-winged form, and Herrick-Schaeffer, from the venation refers this section of the sub-family to the *Attacinæ*, notwithstanding the sack-bearing larvæ. The neuration will hardly guide us in this group, since certain European genera have apparently three internal veins on the secondaries like the Microlepidoptera. Perhaps they are wrongly reckoned here. Some of the moths resemble the *Dasychirinæ*. This resemblance is seen in *Psyche;* but the American genera *Thyridopteryx* and *Oiketicus* have long-bodied males with partly glassy wings and short antennæ, and look more like the *Cossinæ*. As compared with Europe, we have apparently very few species of *Psyche;* in fact only one species is well known, viz.,

Psyche confederata Gr., now described in almost all its stages. The life-history of almost any species in this group will be found replete with curious facts, and instances of parthenogenesis are recorded among the European genera. The moth *Phryganidia californica* Pack., is apparently incorrectly described as belonging to this sub-family, and Butler refers it to the *Dioptidæ*, a group not studied by me. The *Psychinæ* occur in the West Indies, and South America; the genus *Oiketicus* also in Ceylon. This group seems to be, with the *Cochliinæ*, of very general distribution, and to belong to the older forms of the family, retaining perhaps some characteristics of a primitive form of the moths. It may even be that the cocoon or sack was, in past geological ages, more common as a part of larval habit, and that it was later on restricted to the pupal condition. The *Sphingidæ* and groups making no cocoon may have been thrown off from the genealogical tree of the Lepidoptera at later periods. In North America there seem to be but few species of *Psychinæ*, generally distributed; the genus *Oiketicus* being tropical and sub-tropical, *Platæceticus* a Floridian form, the other genera ranging from Canada to the Southern States, while from the west a few species belonging to the more typical section of the sub-family have been indicated. The broad, falcate-winged genera seem to belong east of the Rocky Mountains, and are reported from the region east of the Andes in South America. Hence, their distribution is paralleled by that of the *Ceratocampinæ*.

Sub-family *Notodontinæ*.

Although we have found some reasons for our sequence of the preceding groups, there is here somewhat of a break. For instance, the *Sarothripinæ*, *Nolinæ*, *Chloephorinæ*, make a similar cocoon; in the two first the labial palpi are elongated. The *Lithosiinæ* resemble these more or less in form and the absence of ocelli, but their colors and shorter palpi are more like the succeeding *Arctiinæ*; again the *Dasychirinæ* resemble the latter in their hairy larvæ and style of pupation. There is an approximation to the *Cochliinæ* in the Dasychirid genus *Lagoa*, and the *Cochliinæ* and *Psychinæ* approach by the rudimental abdominal feet of the larvæ; but the *Notodontinæ*, although they fit in with succeeding groups, differ greatly from the *Psychinæ*. I have described a Psychid genus from Cuba, which has something of the Notodontid form, which is that of the Noctuidæ, and which latter several genera of this group greatly resemble. Indeed, there seems to be some doubt as to whether the genus *Edema* is,

as I believe, a Notodontid, or a Noctuid. We may take also into consideration a certain similarity of the abdomen in *Limacodes* and *Ichthyura*, among the superficial resemblances which induce the bringing in of the *Notodontinæ* here ; but the position chiefly recommends itself to me in that we obtain a better sequence for the ensuing groups.

In the *Notodontinæ*, the neuration of the secondaries approaches the *Noctuidæ* in that vein five of the hind wings is (when present) situated midway between four and six from the cross-vein. The form varies, but most of the genera have long wings, and the abdomen exceeds the secondaries. The costal vein of hind wings does not spring from the sub-costal or upper margin of the cell, but is free from the base. The head and thorax are usually thickly haired, the latter being sometimes peculiarly tufted at the sides. The male antennæ are usually pectinate, the female simple. The caterpillars are often naked, that of *Notodonta stragula* almost sphingiform. That of *Apatelodes* is hairy, and Abbot's figures induced the generic name. They have fourteen or sixteen feet, and sometimes the anal claspers are wanting *(Cerura)*, and the body is terminated by two thin prolongations. It is this form of the larva which prepares us for the *Platypteryginæ*, in which the anal projection is single. This subfamily is known to English entomologists under the name of "Pebble Moths," in allusion to the ornamentation, which consists often of shaded spots or blotches. In repose, the wings are folded close to the body. In this position *Datana* looks like a broken twig, the shaded thorax, with its raised tufts at the sides, like the top of the twig at the break. *Datana* is related to the European *Phalera bucephala;* the same mimicry is displayed, but here the colors are paler, and the deception even more apparent.

The American genera are remarkable for their odd forms, and in some cases for the number of species. Among the most unusual is *Apatelodes*, closely related to the South American *Parathyris*. The fore wings are broad, curiously outlined, with sharp tips ; and the soft gray color, the tufted abdomen, present a resemblance to the Sphingid genus *Cressonia*, so that I have called the species of *Apatelodes* : False Hawk Moths. The larvæ of several rarer Notodontids have been described by Prof. French, to whom we are much indebted for life-histories of our North American moths.

Sub-family *Platypteryginæ.*

The moths of this family are frail, geometriform, with falcate or subfalcate primaries, with short maxillæ and palpi, and pectinate male antennæ.

The caterpillars have the anal claspers replaced by a single projection, have fourteen feet and make a cocoon between the leaves, and are probably double brooded, the pupa of the second brood hibernating. I have described the larva of *Dryopteris ;* an allied genus has been described by Walker, from Japan, which I have not been able to compare critically with our two North American species of *Dryopteris.* Mr. Henry Edwards records the European *Frionia lacertinaria* from Canada, and it seems that we have a second species in the *Prionia bilineata* of Packard. We have two species of *Platypteryx* Lasp. *(= Drepana* Schrank*)* from the east, the one more whitish, Walker's *arcuata*, the other more of a buff yellow, my *genicula*. The European genus *Cilix* of Leach, is apparently absent in our fauna. In the shape of the wings this little group resembles the following *Attacinæ*, if we may compare such frail species with the giants of the family. The neuration shows also some approach to the typical Bombyces. The hind wings have eight veins, but the inner of the two internal veins is incomplete ; vein five is nearer to four than to six. The fore wings are twelve veined, and a certain look of miniature Attacids is due to the conformation of the wings. We have a Geometrid genus *Drepanodes*, which, with its pointed primaries, looks like *Platypteryx*, and it is possible that Stephens has so mistaken the species.

STRAY NOTES ON MYRMELEONIDÆ, Part 5.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

Dendroleon pantherinum Fabr.

Myrmeleon pantherinum Fabr., Mantissa, 249, 3—Ent. Syst. ii., 93, 3—Brauer Neur. Austr., 64.

Myrmeleon ocellatum Bork. in Scriba. Beitr. ii., 165, pl. 11, f. 5.

Dendroleon pantherinum Brauer, Wien. Z. B. G. xvii., 963, pl. 14, f 3.

The species was described (1787) by Fabricius, from a specimen wanting prominent parts, antennæ and legs. The descriptions by Villers, Olivier, Gmelin, Latreille and Walker, are simply copies.

Borkhausen, in 1791, described the sa mespecies as *M. ocellatum*, from a specimen found in Darmstadt, Hesse. The description and figure are good, and Burmeister believed the N. American species to be identi-

cal. Prof. Brauer has given a new description in Neur. Austriaca. The species is a very rare one, found, besides in Austria and Hesse, fifty years ago in Silesia and Hungary. The discovery of the larva in the Prater, near Vienna, on trees, and the raising of the imago by Prof. Brauer is one of his numerous splendid discoveries. He made for the species the new genus *Dendroleon*. Both species are recorded as *Glenurus* Hag. in my Synopsis Hemerob. This genus was proposed exactly at the same time with *Dendroleon*, but the latter one should be retained for those species.

The N. American species and the European are very similar, but the rarity of both prevented the exact knowledge of their differences. I have seen of the European species only three specimens, one from the Rhein Mus. Berol., one from Austria, and one from Hungary in Frivaldsky's collection. The latter one I have compared carefully with Burmeister's types in Winthem's collection in 1852. As since this time nothing is published about the differences of both species, I give here my manuscript notes.

D. pantherinum is of the same size, but a little more robust; prothorax plain-luteous, without the fine black granulation of *D. obsoletum*; a large black dorsal band on metathorax and basal segment of abdomen; *D. obsoletum* has mesothorax, metathorax and basal segment above in the middle only with a very dilute blackish color. Abdomen with segment second and third black, the fourth and fifth above light brown; *D. obsoletum* has on all segments, or at least on second and third, a transversal yellow band. Legs yellowish brown; fore legs with a ring around the apex of femur, middle of tibiæ, and third and fourth joint of tarsus all black; middle and hind legs with a broad dark ring before the middle of femur, which is externally nearly connected with the apical ring; the apex of tibia and a median ring, which is wanting on hind legs, black. The coloration of *D. obsoletum* is very different, as stated in the description. Wings with the venation less close, the areoles larger; veins in both wings more fuscous; front wings in the basal third of the space between fourth and fifth longitudinal vein with four fuscous spots, the most apical one longest, about 3 mm. (wanting on *D. obsoletum)*; the ocellate spot on the hind margin is complete *(D. obsoletum* wants always the apical half of the iris around the spot); hind wings with a quadrangular (round in *D. obsol.)* spot near the costa, and ring of spots on the apex of hind margin.

Dendroleon obsoletum Say.

Formicaleo obsoleta Say., Journ. Acad. Philad. viii., 44, 1—Say, Ed. Lec. ii., 413, 1.

Myrmeleon obsoletus Hag., Syn. N. Am. Neur. 225, 2.

Myrmecoleon ocellatus Burm. ii., 995, 1—Walk. 401, 172.

Myrmeleon nigrocinctus Rbr. 398, 20—Walk. 361, 101—Glover Ent. Amer. Neur., pl. v., f. 15 (the figure is a fair one).

Body slender, abdomen little villous. Head narrow, face luteous, between the eyes a broad shining black band, notched on the inferior margin; vertex luteous; antennæ as long as head and thorax, slender, elongated, clavate on tip, blackish fuscous, pale in middle; palpi short, pale; maxillary ones with the three apical joints equal; labials not longer, apical joint fusiform; prothorax elongated, narrower anteriorly, luteous, faintly granulated with black; thorax dull luteous, above darker; on each side above the legs a broad black longitudinal band; below pale; abdomen shorter than the wings (I believe I have not seen a male), blackish brown, with a yellow dorsal, transversal band on the middle of each segment, or at least on the second; the parts in the last segment light brown, with black hairs; above split longitudinally; below on each side a short, flat appendage; legs very long and slender, with short hairs, shining black; anteriors with base of femur and tip of tibia brown; hind legs with a luteous band before the tip of femur, or luteous, tip black; tibia pale, black on tip and after base; or black, pale at base; tarsi long, black; the basal joint sometimes luteous; spurs luteous, as long as the two basal joints; apex incurved; claws luteous; wings hyaline spotted with fuscous; front wings with the inner half of an ocellate spot on the middle of the hind margin; a double spot at the pterostigma, an apical interrupted series, and some dots along the mediana; hind wings with a larger orbicular spot before the pterostigma, and some spots near the tip and the apical part of the hind margin; venation white, some of the forks and the longitudinal veins interrupted with fuscous. Length of body, 20 to 26 mm; exp. al., 46 to 67 mm.

Mr. Sanborn, Mass. Agric. Rep., 1862, p. 161, states:—"Specimens of this insect are sometimes found which differ either with the wings not spotted, but hyaline or sprinkled with fuscous, or costal space with a double series of areoles, or without spurs." Apparently Mr. Sanborn has here confounded several species.

Habit.—Canada, Ontario, Mr. Saunders; southern peninsula of Michigan, Mr. Harrington; N. Hampshire, Mr. Leonard in T. W. Harris's coll. There is a very indifferent figure of Harris's specimen by F. J. Sanborn (it is reproduced in Dr. Packard's Guide, f. 604), in his Rep., 1862, Mass. Agric., p. 160. Mr. Sanborn, who had a most general and reliable knowledge of insects in this country, says:—"It is of common occurrence throughout the country, and this is the only well-known ant-lion in N. England." But I have to state that Harris's specimen is till now the only one from N. England seen by me; N. York, in Winthem's coll. and by Mr. Akhurst; Missouri, St. Louis, Mr. Engelmann; Illinois, Galena, Mr. Bean; Maryland, Mr. Uhler; N. Carolina, Morganton; S. Carolina, Aiken; Virginia; Georgia, June 7 and August 21, in pine woods, rare, in Abbott's figures in the Brit. Museum; Alabama, figured by Mr. Gosse in his letters from Alabama, p. 242 (I have not seen this book); Liskiyon, Cala, Mr. Behrens. Mr. Th. Say states only, "this species is rather common."

The range of this species is very large, and probably a larger one to the south and west. The size is not very variable, except one specimen from South Carolina, and one from Cala., to which belong the smallest given dimensions. Very probably the larva ascends trees as the related European species; and the larva from Washington, D.C., described by me years ago, probably belongs to this species. (Stett. Ent. Z., 1873, p. 271, n. 7.)

Myrmeleon immaculatus De Geer.

M. immaculatus De Geer iii., 564 (365), pl. 27, f. 8—Retzius 59, No. 202—Walker 401, n. 174.

M. melanocephalum Oliv. Encycl. viii., 127, No. 33.

M. immaculatus Hag., Syn. N. Am., 231, 14, partim.

Face shining, black; epistom and mouth yellow; the black color covers sometimes more or less the epistom, notched anteriorly; a fine yellow ring around the eyes, more or less interrupted near the antennæ, and enlarged below near the mouth.

Labrum short, twice as broad as long, rounded laterally, largely notched anteriorly.

Palpi light brown, darker in more adult specimens; maxillary moderately long; thin cylindrical; three apical joints sometimes black, with a

small yellow basal ring; last joint cylindrical, truncate on tip; labial about as long, second joint arcuate, thin, enlarged on tip; last joint of the same length, subarcuate, largely fusiform above, shining black, tip thinner, yellow.

Antennæ a little shorter than head and thorax, clavate, dull black, more or less annulate with yellow, basal joint above yellow, below the basal joints shining black.

Head broad; vertex transversally ovoid, elevated; anteriorly finely rugose; a number of very fine elevated lines originating together between the antennæ, and then diverging; the color and pattern of the vertex varies much; the main color is dull black, with a yellow transversal band, which is entire or more or less divided and may be wanting entirely; two pitchy black transversal bands are divided by a middle longitudinal band, consisting of two anterior and two posterior approximate twin spots, all these pitchy black shining flat spots and bands may be differently shaped; besides there is on each side near the eyes on the vertex a posterior linear flat spot, and another behind this on the occiput; the yellow transversal band fills the space between the two pitchy black bands, and is always interrupted in the middle by longitudinal band; the yellow band is entirely wanting in the N. England, Michigan and N. York specimens, it is more or less indicated in the specimens of the Southern States, and always present in the Western States and Colorado.

Prothorax short, nearly once broader than long; sides about straight; front margin semi-circular, dull brown; the front margin, two large spots on the part before the transverse sulcus, and two smaller ones after the sulcus, and the membrane between the prothorax and mesothorax luteous or yellowish; some black hairs on the sides of prothorax; thorax pitchy fuscous to black above and below; the margins sometimes a little luteous.

Abdomen of female much shorter than the wings; of the males less shorter and more slender; pitchy black; the basal half principally of the females or newly transformed specimens with a large dull luteous spot, covered with short and fine whitish villosity.

Female genitals the same of *M. mobilis*, but the black appendages a little shorter and thicker, with very long black hairs; male genitals similar, but the spoon-shaped part a little shorter.

Legs of the Southern specimens similar to *M. mobilis;* the specimens from the Northern and Eastern States and the Rocky Mts. much more black; the anterior tarsi and larger parts of tibia entirely shining black, but all intermediate colors are to be found; spurs and sometimes the claws brown.

Wings similar, variable in size, shape and coloration; the most striking difference is the hind margin of the hind wings, which is never (in 30 specimens) sinuate in the apical half, but performs a flattened curve, a little more incurved on tip; the mediana and subcosta are darker and the space between them is blackish, where they are not interrupted with yellowish; sometimes the transversals below the mediana and some other veins are fumose; pterostigma white.

Length of body, 25 to 36 mm.; exp. al., 60 to 76 mm. Breadth of hind wing, 5 to 7 mm. The smallest specimens are from Colorado.

Habitat.—30 specimens male and female are before me; Ludington, Mich., Mr. Pierce (raised); Keene, N. H., Mr. F. H. Foster (raised); Peabody, Mass., Mr. G. H. Emerton (raised); Albany, N. York (raised by myself); Maryland, Mr. Uhler; Virginia, Alleghany Mts., and Washington, D. C., O. Sacken; Morganton, N. Carolina, Mr. H. Morrison; Waco, Texas, Mr. Belfrage; Denver, Golden City, Manitou, Colorado, by O. Sacken; Wasatch Mts., Utah, Rocky Mts. Dr. Anderson; Lake Tahoe, Cala., O. Sacken; Sylvania, Cala., Mr. Ricksecker (raised); Oregon, Mr. H. Edwards; Washington Terr., Yakima River, Mr. S. Henshaw.

The imago appears everywhere in June and July. The larva hybernates and transforms in the pupa about May.

The description and the figure by De Geer, though both not sufficient, proved that his species was the one here described; there is no N. American species known, which makes this determination doubtful. There can be no doubt that *M. melanocephalum* Oliv. is the same species. Olivier's specimen was collected by Bose near New York, De Geer's in Pennsylvania. Burmeister's type, now before me, is *M. mobilis.* It would be useless to speak about two species described by Walker, without comparing his types. The same applies to Prof. Taschenberg's species.

When I published the Synopsis N. Am. Neur., I knew only three specimens, which are still before me. I had them separated in two

species, but the insufficient material seemed to make it more prudent to unite them provisionally. Both species are very similar, and the only palpable difference is the hind margin of the hind wings sinuated in the apical half of *M. mobilis*, and convex in *M. immaculatus*. I have raised myself both species, and have the full grown larvæ in alcohol.

(To be Continued.)

THE CHALCID GENUS RILEYA.

BY L. O. HOWARD, WASHINGTON, D. C.

An interesting interference in the adoption of the generic name *Rileya* has recently taken place between Mr. Ashmead and myself, and, as I am of the opinion that this name should apply to the genus of Encyrtinæ defined by myself, rather than to the genus of Eurytominæ defined by Mr. Ashmead, I state in this note the circumstances of the interference, and print in full the paper in which my description occurred.

At the meeting of the Entomological Society of Washington, held June 7, 1887, I read the paper in question and handed the manuscript, after reading, to Mr. Smith, the Secretary, with the request that he publish the generic description in full in his abstract of our proceedings in Entomologica Americana. June 9 this periodical for June was received, and I found upon reading Mr. Ashmead's "revised generic table of the Eurytominæ," published upon pages 41 to 43, that he had decided to use the same name for a genus of that sub-family. The name is there given, *not as a new genus*, but as one already described, and the few words given to it in the table fail to sufficiently characterize it. Noting these points, I did not recall my description from Mr. Smith, and it was published in the July number of the same periodical (received July 5). I inferred from the fact that Mr. Ashmead entered the genus as "*Rileya* Ashm.," and not "*Rileya* n. g.," that his description had been sent away for publication, but had not appeared, and this inference was shown to be correct when upon July 14, first copies were received of Bulletin No. 3 of the Kansas Experiment Station, which contained in an appendix Mr. Ashmead's full description of this genus.

I am individually inclined to think, therefore, that as Mr. Ashmead

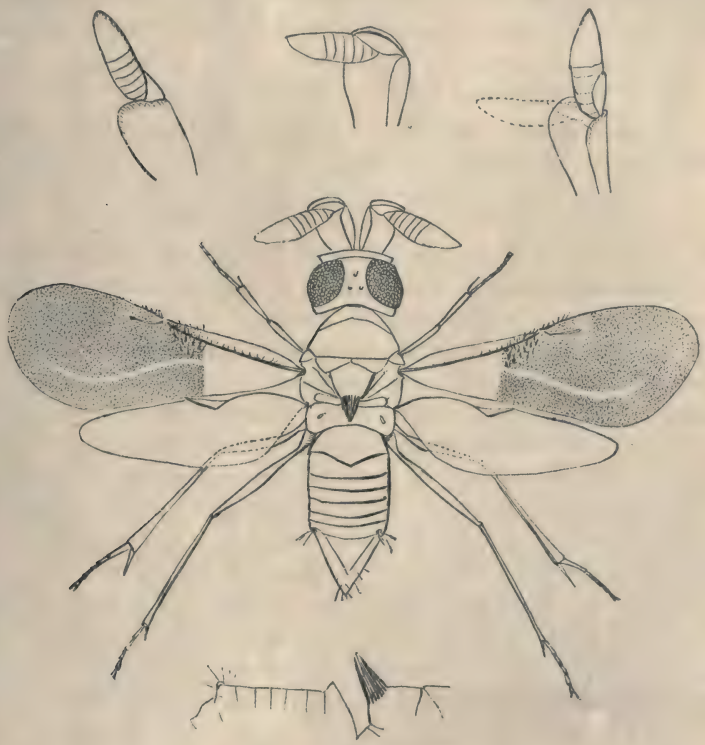
did not give his few words in the generic table to *Rileya as a new genus*, his mention of it there amounts simply to the mention of a manuscript name, and as the full description of *Rileya* Ashmead *as a new genus* was not published for some days subsequent to the publication of my genus, the latter should bear the name. Were this a mere matter of credit for a genus, I would not waste words upon it, and were it any other name I would give way without hesitation to my friend Mr. Ashmead, but my desire to establish the genus in Professor Riley's name, and to apply it to this extremely interesting and beautiful form, is so great that I am led to assert my claim, which of course will stand or fall upon its merits.

The original paper as read before the Entomological Society of Washington, June 7, is as follows :—

"One of the most beautiful insects I have ever seen was sent in considerable numbers to Dr. Riley, from California, by Mr. Koebele, in 1886. It was captured by Mr. Koebele, as stated in his notes, while searching for a species of *Dactylopius*, which lives upon the Passion Flower at Los Angeles. His account of the actions of the little parasites upon this plant is interesting enough to quote : 'A number of the parasites were collected on a plant, and some of them were noticed depositing their eggs. Busily they ran up and down the branches, and if they met with a grown insect, this was touched from behind with their antennæ from five to fifteen seconds ; then either the parasite would run off or turn around and thrust an egg into the insect, which, when the parasite approaches, keeps perfectly quiet ; but if operated on, will turn the posterior part of its body rapidly around in a circle, and its enemy will, after the egg is left, walk quietly off without facing its victim again.'

"This little parasite, although only about a millimeter and a-half in length, is a perfect gem in color. It is a fleck of brilliant green-gold, and its structure is very strange to one not familiar with the peculiar group of genera to which it belongs. The remarkable antennæ, with their concave leaf-like scape, peculiar pedicel, and broadly flattened flagellum carry to an extreme a conformation seen only with the three genera—*Mira*, *Anusia* and *Cerapterocerus*—of the sub-family *Encyrtinæ* of the *Chalcididæ*. I have always supposed that the preliminary tapping of a Bark-louse, with the antennæ, as described by Mr. Koebele above, and as often noticed with other parasites, was for the purpose of ascertaining by a tactile sense

or by sound whether the Bark-louse was already inhabited by a parasitic larva, and it is altogether likely that this extraordinary development of the antennæ in these genera is of use in this direction, and was developed in response to some such need, for it will be noticed that this conformation occurs in the female sex only, and that the males of such of these genera as have known males have antennæ of the ordinary pedicillate whorled type.



RILEYA SPLENDENS.

"The relationships of this California parasite, although it forms a new and in some respects abnormal genus, are plainly with the European genus *Cerapterocerus* of Westwood *(Telegraphus* Ratz.*)*, of which two species have been described, viz., *C. mirabilis* Westwood, and *C. corniger* Walker, of both of which we have authentic specimens in the collection of the National Museum, through the courtesy of Dr. Mayr, of Vienna. The

former has been reared from a Lecanium on peach by Tschek, from a Lecanium on plum by Kollar and Rogenhofer, and from coccids on grass by Kollar and Kriechbaumer; while the latter has been reared by Kriechbaumer from coccids on plum and grass.

"I have, with Dr. Riley's kind permission, dedicated this remarkable and beautiful genus to him, in acknowledgement of the work which he has done in making known the life-histories of American hymenopterous parasites, not less than in acknowledgement of the opportunities he has given me, and the assistance and encouragement he has rendered me in the study of the interesting family to which it belongs.

"*Rileya*, Gen. nov. Female. Moderately stout, resembling somewhat *Cerapterocerus* Westwood (see Mag. Nat. Hist. vi., 1833, page 495; see also Snellen van Vollenhoven, Schetsen, Tab. vii; see also Mayr, Die Europaischen Encyrtiden, Verh. d. k. k. Zool. Bot. Ges. Wien, 1875, page 747; see also Ratzeburg, Ichn. d. Forstins. ii., 1848, page 152, under name *Telegraphus)*, but differing as follows: The face is not elbowed in the middle so as to give a triangular profile to the head, but is gently rounded, and has a strong glistening transverse clean-cut ridge just above the insertion of the antennæ, which are stouter and with a more concave scape than with *Cerapterocerus*. The mesoscutellum has a strong tuft of erect black hairs as in *Chiloneurus*, but which is lacking in *Cerapterocerus*. The stigmal vein is given off immediately at the juncture of the submarginal with the costa, and is a trifle longer than the postmarginal. The submarginal is three and one-half times as long as the stigmal. The postmarginal, the distal third of the submarginal, and the wing disc below this last heavily clothed with short stout bristles. The body is highly polished and the wings are not hyaline. The metanotal spiracles are large, long-oval and oblique, and the abdominal spiracles are very prominently tufted. The ovipositor does not protrude, except in specimens killed in the act of oviposition.

"*Rileya splendens*, Sp. nov. Female. Length, 1.63 mm.; expanse, 3.8 mm.; greatest width of fore-wing, 0.53 mm. Front with a delicate round-oval punctation; cheeks with delicate longitudinal striation, and a perfectly smooth band bordering the eyes; mesoscutum very delicately shaggreened; scutellum and scapulæ smooth; mesopleura and abdomen smooth. General color metallic green, the most brilliant reflections given off from the cheeks and the proepimera; antennæ also with metallic reflections,

but darker in general effect ; mouth-parts honey-yellow ; abdomen bluish-metallic below ; all legs metallic ; joints 2, 3 and 4 of tarsi honey-yellow. Distal two-thirds of wings (fore) dark brown ; the proximal limit of the color very definite, and the color deepest at this point, becoming lighter at tip of wing ; a narrow, longitudinal, slightly curved, hyaline line arises at the middle of the proximal border of the infuscation, and extends rather more than half way to the tip of the wing. Described from many female specimens. Los Angeles, Cal., A. Koebele."

ANNUAL MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The annual gathering of the Entomologists of North America, in connection with the meeting of the A. A. A. S., took place this year in the city of Cleveland, Ohio. While much regret was felt at the absence of many eminent Entomologists who have always taken an active part in the work of the Club, and at the consequent smallness of the attendance, the meeting was much enjoyed by those who were present, and the valuable papers read were received with great interest.

The first session was held at 9 a.m. in a class-room of the Central High School Building on Wednesday, August 15th ; the President, Mr. John B. Smith, of Washington, in the chair. In the absence of the Secretary (Prof. A. J. Cook, of the Agricultural College, Mich.) Professor Herbert Osborn, of Ames, Iowa, was requested to act in his place. Owing to the smallness of the attendance the Club adjourned till 1.15 p.m., when the President read his annual address on " Entomological Collections in the United States." In this interesting and valuable paper, which, as well as the other papers read at the meetings of the Club, will, we understand, be published in full in *Entomologica Americana*, the writer gave an account of all the great collections, both public and private, in the United States. Among general collections he especially mentioned those of Mr. Bolter, of Chicago, and Mr. Henry Edwards, of New York ; in Coleoptera he specified the collections of Dr. Horn, of Philadelphia, Mr. Ulke, of Washington, and Messrs. Hubbard and Schwarz, and Lieut. Casey ; in Lepidoptera those of Messrs. Henry Edwards, Neumogen,

Strecker, Graef, Tepper, Holland, W. H. Edwards, Lintner, Bailey, and Meske; in special departments of Lepidoptera those of Mr. W. H. Edwards, Rev. Dr. Holland, and Mr. Bruce in Butterflies; in the Hesperidæ that of Mr. E. M. Aaron, of Philadelphia; in the Sphingidæ that of Mr. E. Corning, of Albany; in the Geometridæ that of the Rev. G. D. Hulst, of Brooklyn; and in the Tortricidæ that of Prof. Fernald, of Amherst, Mass. He also noticed many other collections in various orders for which we must refer the reader to the address itself.

After hearing the address the meeting adjourned till the next day. The following persons were in attendance during the sessions :—John B. Smith, Washington, D.C.; Prof. H. Osborn, Ames, Iowa; Prof. F. M. Webster, Lafayette, Ind.; Dr. D. S. Kellicott, Buffalo, N.Y.; Mr. and Mrs. O. S. Westcott, Chicago; L. O. Howard, Washington; J. Mackenzie, Toronto; A. B. Mackay, Agricultural College, Miss.; D. A. Robertson, St. Paul; S. H. Peabody, Champaign, Ill.; Dr. C. V. Riley, Washington; S. B. McMillan, Signal, Ohio; Rev. L. C. Wurtele and Miss Wurtele, Acton Vale, P.Q., and others.

The Entomological Society of Ontario was represented by its President, Mr. J. Fletcher, of Ottawa, and the Rev. C. J. S. Bethune, of Port Hope.

On Thursday, August 16th, the Club met at 1 p.m., and entered upon the consideration of the President's address; this naturally led to a discussion upon the best materials for boxes, &c., in which to preserve collections. Mr. Howard stated that the boxes in the Museum of Comparative Zoology at Cambridge, Mass., had their bottoms made of Italian poplar. Mr. Fletcher asked for the experience of members with poplar, tulip-tree and other woods as regards cracking and splitting. Dr. Riley said that there was no wood that would not split, warp or crack; the only remedy was to have the materials kiln-dried and then soaked in shellac and alcohol. He adopted the form of boxes used in Washington for the sake of convenience rather than otherwise. The cabinets in Europe were not subjected to the same dry heat as in America, and were consequently not a guide to us in this respect.

Mr. Fletcher stated that there are only two noteworthy collections of insects in Canada: (1) that of the Entomological Society of Ontario at London. It is not very large, but is very good as representative of the

Canadian fauna, while it contains many specimens from the United States and other countries. The collection of Lepidoptera is especially good and well named, having been revised by Mr. Grote before it was sent to the Philadelphia Exhibition, in 1876. In Coleoptera and other orders great care has been taken to have the specimens well named. The collection is open to any one who desires to examine it. (2) The collection of Lepidoptera in the National Museum at Ottawa is very good. The nucleus was formed by the purchase of about 8,000 specimens from Captain Gamble Geddes, of Toronto. It is now being added to by the officers of the Geological Survey, who bring to it from time to time rare specimens from out-of-the-way and little known regions. There are several private collections of value, but it is unnecessary to specify them. Mr. Fletcher agreed with Mr. Smith that "types" of new species should be placed in some national collection where they would be accessible to all students. For his part he should always be glad in future, as in the past, to place "types" whenever possible in the National Museum at Washington.

A discussion then arose as to what is meant by a "type." Mr. Fletcher understands the term to mean all the specimens actually before a describer when he is making out his description of a new species. Some writers, however, call all specimens types that may afterwards be identified by the describer as agreeing with the originals. Mr. Howard agreed with Mr. Fletcher that only the material before a describer at the time is to be called "type;" other specimens should be marked "determined by the author." Dr. Riley thought that all the materials determined by an author might be called "types of that species," provided that they do not vary from the original specimens. Prof. Webster considered that all typical material should be placed in some national depository where it would be perfectly safe, and instanced the loss of the Walsh collection by fire as a calamity to science; collectors should be willing to sacrifice their types for the general good of science. Mr. Smith was also of opinion that only the specimens before the author at the time of making the description are "types," and that specimens determined afterwards are not really "types." Mr. Fletcher referred to *Chinobas Macounii* as an example. Mr. W. H. Edwards had eleven specimens before him when he described the species; these are types, though most of the specimens were imperfect. During the past summer the speaker

had obtained from the original locality a good supply of specimens in perfect order, and although these agreed with the original description perfectly, they should only be labelled as "typical," and he was of the opinion that the describer even would not be justified in labelling them "type." Professor Osborn agreed with the last speaker.

(To be Continued.)

CORRESPONDENCE.

NOTES ON IPS.

In vol. xvii., p. 46, of the CAN. ENT., Dr. John Hamilton gives some notes on *Ips fasciatus* and allied forms. He says:—"The form *fasciatus* is the most common here (Allegheny, Penn.), and is that into which all the others are resolved; in it the elytra are black with an irregular broad basal, and a sub-apical fascia, yellow; individuals are met with totally black without any spot; others have only a small basal and sub-apical spot yellow (more often reddish); others add to these a humeral lunule; others have various other spots, and by the gradual dilation and coalescing of these through a series of specimens, the full form *fasciatus* is reached." He further says that he has never met with these black and spotted forms at any other time than in early spring, usually during April. As the season advances these entirely disappear and the fasciate form alone remains, continuing till autumn. Judging from my observations of these forms at Montreal, I cannot quite agree with Dr. Hamilton's opinion. I find that in the fasciate form the colour is bright clear yellow, while in all the spotted specimens that I have seen the colour is very pale yellow, almost white; the difference in this respect being very marked. With respect to seasons, I find that the spotted form, or what I take to be *4-signatus*, occurs during summer as well as in spring, as the following notes will show:—April 24th, 1886, found *Ips fasciatus* and the spotted forms common at a bleeding stump on Montreal Mountain, *4-signatus* being most abundant. June 12th, 1886, found several specimens of *Ips 4-signatus* in a small hole in the bark of an oak tree, where the sap was oozing out. August 5th, 1886, found a specimen of *Ips 4-signatus* on a tombstone in Mount Royal Cemetery. August 15th, 1886, found a specimen of *Ips 4-signatus* on a tomato on the breakfast table. July 26th,

1888, found a specimen of *Ips 4-signatus* in a jug of milk. The last "find" was a rather curious one, but the specimen was quite fresh, and had evidently been "supplied" with the morning's milk. No specimens of *fasciatus* were observed during the summer months, so that my experience appears to have been just the reverse of Dr. Hamilton's.

F. B. CAULFIELD, Montreal.

INSECTS FEIGNING DEATH.

Dear Sir: I have read with much interest Mr. A. R. Grote's communications upon the subject of "Insects Feigning Death," glad always of the opportunity of learning from the older members of the entomological fraternity. But in this case I am not sure that I comprehend the gentleman's meaning. In the June number of the CAN. ENT. he expresses a doubt in regard to insects possessing any knowledge of death, and hence considers that they are not mentally capable of feigning death. In the August number he again takes up the subject and says, "It is probable to me that their attitudes of repose are assumed from the experience they have gradually acquired, that in a state of quiet they will best avoid the immediate dangers which beset them, etc." Immediate dangers of *what?* Physical pain, a knowledge of which they have gained by frequent captures and escapes? It strikes me that it is not only not this, but death itself which they seek to avoid. With no knowledge of death, as such, why should they seek to avoid it? Is it not true that all animal life is doomed to die sooner or later? And is not a knowledge of the fact that it is something to be feared and avoided as long as possible, necessary to the perpetuation of species? Surely even insects would not seek to avoid that of which they have no knowledge. Does not the very presence of the sense of fear presuppose a knowledge of death, in the sense of annihilation? If the larva of a *Geometer* has learned, no matter whether by experience or instinct, that by assuming a certain rigid position resembling a portion of the twig upon which it is itself located, it is thereby enabled to escape destruction in common with the twig; might not another species, by the same course of reasoning, learn that, to assume the same inanimate position as a dead companion who is not carried away, it also might escape? Beetles belonging to the genera *Chlamys* and *Exema*, of the family *Chrysomelidæ*, will often drop from a seemingly

safe position on the stem of a plant to the exposed upper surface of a leaf of the same, remaining there perfectly quiet without making any further attempt to escape, their only protection being the form and color of their bodies, which very strongly resemble the excrement of caterpillars. After all have we not reason to believe that life, to an insect, embodies all that is precious; the alpha and omega of all that is worthy of being cherished and protected? Knowing as we do the great variety of methods by which insects seek to protect this life, is it so highly improbable that they should hit upon the plan of feigning its absence? The question is an interesting one, though difficult, and, perhaps, impossible to solve; yet it certainly involves nothing that should lead us to forget that we are fellow-workers.

F. M. WEBSTER, Lafayette, Ind.

DANAIS ARCHIPPUS.

Dear Sir: In view of the discussion now going on respecting this insect, it may not be amiss to give some observations from this locality. *D. archippus* (alias *plexippus*) is an exceedingly common butterfly in Custer Co., Colorado, from the end of April throughout the summer. At the present time it is abundant near my house, at about 8,400 feet alt., especially frequenting the flowers of *Oxytropis lamberti*, and also seeming much attracted by a patch of *Trifolium pratense* that has sprung up in a timothy field. But the peculiar thing is, that so far as I know, *Asclepias*, the food-plant, does not occur nearer than some four or five miles away, and at perhaps nearly a thousand feet lower elevation. The only larva I have seen here was an immature one brought to me July 3rd, which had been found on *Asclepias* at about 7,300 feet alt., some six miles from here. Yet the specimens of *plexippus* found up here at 8,400 feet are perfectly fresh and undamaged (much more so than *Papilio asterias*, which breeds up here), and further, are frequently to be seen paired.

July 22nd. T. D. A. COCKERELL, West Cliff, Colorado.

NOTICE.—The Annual Meeting of the Entomological Society of Ontario will be held in the City Hall, Ottawa, on Friday, October 5th. It is hoped that there will be a full attendance of members.

Mailed October 3rd.

The Canadian Entomologist.

VOL. XX. LONDON, NOVEMBER, 1888. No. 11.

AN EXTREME CASE OF SEASONAL DIMORPHISM IN COLIAS.

BY T. D. A. COCKERELL, WEST CLIFF, COLORADO.

It was thought strange when it was proved that *Colias keewaydin* and *C. eurytheme* were seasonal forms of a single species. Still stranger did it seem when Mr. W. H. Edwards proved by breeding that *C. eriphyle* (alias *Hagenii)* was also a form of *eurytheme*, but even after this I was not quite prepared for the conclusion, forced upon me by irresistible facts, that in this locality the orange and yellow forms were not only of one species, but actually alternated seasonally, the former being the summer, and the latter the winter form. The locality in question is the eastern slope of the Sangre de Cristo range, in Custer County, Colorado, in the neighborhood of Swift Creek, at altitudes varying from about 7,800 to 8,400 feet. Only two forms of *C. eurytheme* are found (exclusive of the pale females), and neither of these agrees precisely with those already described, so that ("West American Scientist," 1888, p. 42,) I called the orange one *intermedia*, and the sulphur yellow form *autumnalis*, this last being very close to *C. eriphyle.*

The facts of the case are best shown by extracts from my diary, all bearing upon this locality :—

July 13th, 1887.—Arrived here, found *intermedia* flying abundantly, and so until the middle of August, when I left for a trip to the western slope. No *autumnalis* seen.

October 22nd.—Returned to this locality ; a few worn *intermedia* seen, the last of brood.

November 9th.—Caught a ♀ *autumnalis*, the first I had seen.

May 13th, 1888.—Caught a ♀ *autumnalis*—the first of the year. Soon after *autumnalis* became common, but no *intermedia* seen. The first ♂ was caught May 19th. (The ♀'s of both forms of *eurytheme*, and also of *C. alexandra*, seem to emerge here sooner than the ♂'s.)

June 4th.—The first *intermedia* of the year seen.

June 8th.—*Autumnalis* still abundant, but some *intermedia* seen.

June 12th.—*Intermedia* becoming common, and *autumnalis* scarce.

June 26th.—*Intermedia* abundant, a single *autumnalis*, a ♂, taken, and this is the last seen.

C. eurytheme var. *intermedia* is now (July 17th) abundant, and *C. alexandra* is flying very freely. It is a curious circumstance that the so called "albino" females (var. *pallida*) do not appear to occur in *autumnalis*, or if they do are very rare, while they are so frequent in *intermedia* that I have sometimes fancied they even outnumbered the typical females. In both forms, I think, the females outnumber the males.

From the above facts, I think that it is hard to come to any other conclusion than that the orange and yellow forms alternate, and that this should be so, presents perhaps one of the most remarkable cases of seasonal dimorphism at present known.

There is a very large Asiliid fly found here, which occasionally preys upon *C. eurytheme* var. *intermedia* in the perfect state.

DESCRIPTION OF A NEW SPECIES OF ORTHESIA FROM CALIFORNIA.

BY WILLIAM H. ASHMEAD, JACKSONVILLE, FLA.

In a collection of Hemiptera sent me some time since for identification, were two male specimens of a coccid, and a single white waxy sac, from which one had issued, attached to the upper surface of a small, oval leaf, which at the time, from a superficial examination, I took to be a mealy bug, *Dactylopius longifilis* Comstock; but recently on a more careful examination I find to be a species of that interesting genus *Orthesia* Bosc.

But a single species has been described in this genus in our fauna, *i.e.*, *Orthesia Americana* Walker. A good description of what is supposed to be this species was given by Prof. Comstock in the U. S. Agricultural Report, 1880, page 349. As the present species does not agree with that description, it is apparently undescribed, and below I give a description of it, naming it in honour of its discoverer, Mr. Hy. Edwards, who took it at Grass Valley, Nepa County, California.

Orthesia Edwardsii n. sp.

Male sac.—This is broadly oval, pure white, .15 of an inch long by .12 of an inch in breadth. It was evidently formed by a secretion of fine, waxy flakes, the regularity of which has been lost as the insect reached maturity, the dorsal disk being entire, and the flakes only being partially distinguishable at the margins.

Male.—Length .12 inch; style about .04 inch. Entirely black, excepting a reddish cast on the mesothorax, scutellum, metathorax, abdomen at sides and beneath, and the epipleura of the mesothorax; while the head beneath the insertion of the antennæ is pale yellowish white. Head small, nearly quadrate, being but slightly narrowed posteriorly. The eyes consist of 5 or 6 ocelli placed at the side of the head, while the mouth consists of two large, quite prominent ocelli. Antennæ very long, the points of which have four or five irregular nodose swellings, with irregular whorls of long, delicate bristles; the first two joints are very short, not as long as wide, the 3rd and 5th joints the longest, about an equal length, the 4th, 6th, 7th, 8th and 9th shorter and gradually subequal, the 10th or apical joint more thickened, fusiform, about four-fifths the length of the penultimate joint. Thorax short, less than one-half the length of abdomen; the prothorax is hardly distinguishable from above, being but a delicate ridge or collar; mesothorax quite short, somewhat trapezoidal in outline, and obliquely ascending towards the scutellum, but with a depression in the middle, the lateral lobes distinct; scutellum highly convex, polished, with some short hairs on the disk, abruptly transversely divided by a deep, yellowish fissure posteriorly. Metathorax very short. Legs very long, rather slender, black, and with a long, fine hair pubescence; tibiæ longer than their femora, slender, cylindrical; tarsi less than one-third the length of tibiæ and more slender, gradually acuminate toward apex and terminating in a small, delicate claw; no digitules. Abdomen, on the dorsum, wrinkled, at sides towards apex covered with a white, waxy substance, and terminating in two very long caudal setæ, more than double the length of the insect, rather thickly covered with a white, waxy substance, especially at base, so that in reality they are much more slender than they appear. Style long, blackish. Wings two, white, of the ordinary shape, but I can detect a spurious vein, springing from near the base of the longitudinal vein, between it and the costal margin, and running parallel with it to half the

length of the wings. I have examined many male coccids, but never before noticed this spurious vein, and consequently think it of great importance. Halteres linear, terminating in a hook with two teeth; one of the halteres is attached to a fold or thickening in the front wing, and as has before been observed, evidently greatly assists the insect in its flights; the other one was loose, and thus enabled me to make out the two small teeth.

STRAY NOTES ON MYRMELEONIDÆ, PART 5.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

(Continued from page 191.)

Myrmeleon mobilis Hag.

M. mobilis Hag. Stett. Z., vol. xxi., 368; vol. xxvi., 444. (No description.)

M. immaculatus Burm. Vol. ii., 994, 5 (not De Geer)--Hagen Syn. N. Am. 231, 14, partim.

The face above the epistom blackish brown, shining; mouth and a ring around the eyes yellowish; palpi yellowish; maxillary thin, apical joint cylindrical, notched on tip; labial of same length, apical joint fusiform, the conical tip notched.

Antennæ as long as head and thorax, thicker at tip, which is clavate, fuscous, annulated with yellow, except on club; basal joint yellow above, second black; antennæ below largely yellow.

Head dull luteous, with some flat pitchy-fuscous spots; vertex transverse-ovoid, elevate, anteriorly finely rugulose; on the middle two pairs of twin bands, one behind the other; the anterior pair with hind end of its band bent outward; a round spot on each side of the bands; the posterior pair straight; on each side two triangular spots, near the eye; behind the vertex on each side a transversal band, near the eyes.

Prothorax broader than long, sides about straight, front margin semi-circular, luteous with some black hairs besides; anterior part before the transverse sulcus on each side with a black crescent and indistinct median band; hind part on each side with an indistinct black mark; thorax dull luteous, with some indistinct brown shadows besides and below,

Abdomen much shorter than the wings, slender, dull luteous, more yellowish on the apex, articulations pale; covered with very short pale villosity.

Female—Last segment short, yellow, split below near the ventral margin with two, thick, black shining cylindrical appendages, which are as long as the segment and covered with very long black hairs and spines; out of the superior part of this segment is protruded an additional short segment with two short quadrangular yellow plates with black margins, and below two transversal rows of very strong black spines.

Male—Abdomen not longer than of the female; ventral part of last segment not split below, yellow with long black hairs, forming a large spoon-shaped part; there are no cylindrical appendages; the additional segment forming two yellow plates which are shorter but much more prolonged below and a little enlarged; margin black with long black hairs below, without the rows of spines; above on dorsum with a bunch of hairs.

Legs slender, pale, with black hairs; the femur, tibia and all joints of tarsus black on tip; a fine black ring on tibia not far from the knee; spurs as long as the basal joint, straight fuscous. Wings long, narrow, front wings with the costa straight, curved strongly on tip, which is short, about rectangular; hind margin very slightly incurved, so that the wing is broadest near the apical third; hind wing nearly as long, a little narrower, sharply pointed; hind margin a little sinuate on the apical half, broadest near the middle of its length; hyaline, hairy, veins fine, dark; subcosta, mediana and submediana interrupted with pale yellow; pterostigma small, whitish.

Length of body, 30 to 34 mm.; exp. al. 80 mm.

Hab.—Burmeister's type from Savannah, Georgia, very probably collected by Dr. Zimmermann; it is a female, and was described out of Winthem's coll.; the label, *immaculatus* De Geer, in Burmeister's handwriting, is still on the pin. I have raised male and female in July, 1883, out of larvæ from Alabama, given by Prof. Lyon; I have the full grown larva, larva skin, nympha skin and cocoon. The larva is called Doodle, and it is a favourite pleasure of children to kneel in the sand near the holes and to sing in a monotonous way, "Doodle, Doodle, etc." It is believed that the animal comes out to receive food. But I have to remark that the larva of *Tetracha Carolina* is treated similarly.

The type is just transformed, as is proved by specimens from Alabama, which made their transformation on the same day; one has all four wings developed, one only the fore wings, and the third has all wings crumpled. Nevertheless they have all the same colours of the type, and it is to be supposed that older specimens will show a darker coloration.

I have never seen more specimens. When I published the synopsis I had before me the type of Burmeister and two specimens of *M. immaculatus*, and believed all three to belong to the same species.

Myrmeleon formicalynx L.

The synonymy need not be repeated here; compare Stett. Ent. Zeit., 1866, p. 439.

Face shining black, above with two impressions, which are variable in shape and size, and an engraved spot in the middle between the antennæ; around the eyes a yellow ring, interrupted near the vertex; epistoma yellow, with two black spots connected with the colour of the face; mouth yellow.

Maxillary palpi slender cylindrical, black shining, pale on tip; apical joint notched on tip, third joint incurvate; the two basal joints globular, dull yellowish, the second blackish externally; labial palpi longer and stronger, shining black; second joint incurvate, thickened on tip; last joint thick, ovoid, with an engraved spot externally before the tip, which is pyramidal, pointed.

Antennæ shorter than the thorax; tip clavate, dull black, below shining black on base; basal joint yellow, below black in middle, and with a yellow ring around the base.

Head dull black anteriorly, with rare white hairs, finely rugose, the lines diverging; vertex transversally ovoid, elevated, divided by a more or less pronounced median impression, on top with a transversal corrugated band, and some glossy flat spots; two approximate anteriorly and two posteriorly, and on each side a larger round one; behind the vertex near the eye an oval similar spot.

Prothorax short, broader than long, enlarged behind, rounded before, dull pitchy black; margin yellow except in middle anteriorly; yellowish near the thorax; on each side with some longer black hairs; mesothorax and metathorax pitchy black; the body paler.

Abdomen slender, compressed, shorter than the wings, pitchy black; apical margin of the last segments pale; villosity white, rather scarce.

Female genitals with two transverse rows of black bristles, two cylindrical black appendages with very long black hairs, and between them an advanced black part of the margin with strong bristles. (Rambur says with two appendages "formant deux petites saillies an peu plus épaisses" —which I cannot find.)

Male genitals similar to *M. mobilis*, the spoon-shaped part shorter, triangular, yellow.

Legs slender, reddish-yellow; apical half of femur black; tibia blackish; the posterior legs externally reddish-yellow, except on tip; tarsi blackish, sometimes yellowish at base; spurs about as long as the basal joint, straight; claws brown.

Wings in shape and venation like *M. immaculatus*, with the hind margin convex; hyaline; veins black, interrupted with yellow; pterostigma milk-white, blackish interiorly.

Length of body, 25 to 32 mm.; exp. al., 55 to 84 mm. Breadth of hind wings, 6 to 8 mm.

Hab.—Everywhere in Europe, only England and the islands in the Mediterranean excepted. A pair collected in Castilia by Staudinger is quoted by myself Stett. Ent. Z., xxvii, p. 290. A. Costa figures it from Naples. In Russia it is known from Livland to Astrachan and Nertschinsk, Siberia.

I have eight specimens, male and female, before me from Sweden, Prussia, Silesia, Switzerland. The imago flies from July to September. I have raised this species, which is common in Germany.

In the collection of Linnæus a specimen of this species *on the characteristic Linnean pin, bearing in his own handwriting on the label the name "formicalynx,"* is still present. I have seen it in 1857 and 1861.

The high authority of my friend McLachlan, and the emphasis with which he declines to acknowledge this specimen as typical (Tr. Lond. Ent. Soc., 1871, p. 443), oblige me to state why I hold decidedly the contrary opinion. Mr. McLachlan bases his objection solely on the fact that the specimen is identical with the Swedish species, and that the African habitat, given by Linnæus for his *M. formicalynx*, must belong to a different species (though the few words of the diagnosis given will apply

to this insect so far as they go.—McL.), because no specimen from Africa is known to him; and "that the collection of Linnæus has been maltreated by additions, destruction and displacement of labels." The discovery of a true African specimen would make McLachlan's objection untenable. Nobody would be surprised that an insect, with such a large distribution, and found in Castilia and Naples, should be found in Africa. For the statement of the displacement of labels in the Linnean collection McLachlan quotes the preface of Staudinger's Catalog der Lepidopteren, 1871, p. xvi.–xvii. This quotation is indeed very unfortunate, as the German original is essentially different (p. xvi) from the French translation (p. xvii.) which is alone used by McL.:—"C'est malheuresement un fait certain que l'acquéreur de la collection de Linné a eu la deplorable idée de remplacer quelquefois des exemplaires endommagés par des exemplaires frais—*vielleicht* vorhandene schlechte Exemplare durch bessere ersetzte." So long as McLachlan gives not any other evidence for his opinion, it is apparently not admissible.

Concerning the Neuroptera in the Linn. collection, I have published (Stett. Ent. Z., vol. vi., 1845, p. 155) the list *still before me*, made in 1844 by Mr. R. Kippist, then Secretary of the Linn. Soc.

Of the 83 species described in Syst. Nat. Ed., xii., were present 50 species, but 17 of them were later additions, with labels written *not by Linnæus*, but probably by Mr. Smith, with the occasional addition "exdescript Linn." These 17 species are marked *only with pencil* in Linnæus's own copy of Syst. Nat. Ed., xii. The other 33 species have labels in Linnæus's own handwriting, and are marked in the copy of Syst. Nat. Ed., xii., with ink. From these alone it is certain that they were in the collection of Linnæus, and *among these is M. formicalynx*. I have compared myself the collection in 1857 and 1861. I found nothing changed and no indication of displacements.

Illiger's paper, 1801, in his Magazin, vol. i., p. 7.

Westwood's paper of the Linnean Staphylinus (Tr. Ent. Soc., Ser. I., vol. iv., p. 45); Schaum "neber zweifelhafte Kaefer Linné's nach seiner Sammlung," Stett. Ent. Z., 1847, p. 276; Haliday ibid., 1851, p. 131; Motschulsky, 1855, Etudes. Ent., iv., p. 25, will show that the sweeping charges in McL. paper can not be considered as warranted.

The description of *M. formicalynx* in Ed. x. is the same as in Ed. xii., excepting the clerical error "antennæ setaceæ" for clavatæ, as given in

the character of the genus. The quoted figure of Rœsel well represents this species. The insects in Linné s collection have been labelled by him in accordance with Ed. x. of his Syst. Nat. At this time the imago of the Swedish species (1758) was unknown to him, and was only published later (1761) in the Ed. ii., of his Fn. Suecica. It is evident that Linnæus has believed Reaumur's species and the Swedish one to be identical, as he says in Ed. xii., "Alae nostratis obsque maculis fuscis," and as he has called this species *M. formicarium*, instead of *M. formicaleo*, as in all his anterior works. Now every student of Neuroptera, since half a century ago, knows very well that Linné has combined two different species, and that a new name would be needed for one of them ; but as a second species had been *described also by Linnæus* this name was accepted for the Swedish species as *M. formicalynx*. Therefore, indeed, no mistake and no uncertainty was possible. McLachlan has given no proof for his opinion that *M. formicalynx* from Africa belongs to a different unknown species. McLachlan's quotation l. c., p. 441 and 442, "In the first edition of the Fn. Suec., 1746, he (Linné) says of an antlion *alae obsolete nebulosae*," is not to be found at all in this book, and could not be found, as Linné described only the larva. The words *obsolete nebulosae* occur in no work of Linné, nor in any other work known to me describing this insect ; but I have now the kind information by McL. that those words were taken out of the interleaved copy of the Fauna Suecica, and that my friend is now sure that they belong not at all to *Myrmeleon*.

McLachlan proposes to use the name *M. formicarium*, which every body has used for more than a century, since Syst. Nat., Edit. xii., 1767, for Reaumur's species, *for the Swedish species*. McLachlan proposed for Reaumur's species at first the name *M. formicaleo* used by Linné in Ed. x. and by Poda ; later he proposed to call it *M. Europæus*, which was adopted by Mr Redtenbacher and Prof. Brauer, though the latter remarked that if a new name was needed *M. nostras* Fourcroy *would have the priority*.

Concerning such changes of names, should be studied the excellent dissertation of Dr. Elias Fries, Ofver Vexternes Namn Upsala, 1842 (also in Fries's Botaniska Utflygter, T. i., p. 113, and German Transl. in Hornschuch Archiv., 1855, T. i.), where also about Linné's collection, the former idolatry and the later belittling in England, excellent advice and notice will be found.

Myrmeleon formicarius, Linn.

The curious habits of this insect are known for nearly two centuries and quoted so often that in my Synops. Hemerobidarum, p. 439, about half a page is filled by them. There is much written pro and con about this name. I believe the change of the name is simply a matter of taste, and I remember with merriness the page on which the late R. Crotch, my old friend McLachlan and myself were hacked to pieces for our heresy in nomenclature by A. Lewis. I consider the paper of McLachlan, Tr. Lond. Ent. Soc., 1871, p. 441, to be a very fair one. Of my two objections one has been removed by himself as I mentioned by *M. formicalynx*.

Myrmeleon rusticus Hag.

M. rusticus Hag. Syn. N. Amer. Neur. 233, 17.

Front a little convex, nigro-piceous, shining, above with two transverse small impressions; epistom black, or on each side with a yellow oval spot, which may encroach a little on the front, and a triangular yellow middle spot, largest anteriorly; rhinarium bright yellow, labrum largely notched, brownish; maxillary palpi yellowish, apical joint a little darker, cylindrical, notched at tip, scarcely longer than the preceeding; labial palpi longer, yellowish, second joint thin, incurved, thickened at tip; apical joint about as long, strongly ovate, blackish, with an impressed spot outside, suddenly contracted before end, which is thin, pyramidal, a little incurved; head below and a narrow ring encircling the eyes bright yellow; antennæ strongly clavate, longer than head and prothorax, dark, annulated with yellow.

Vertex obscure ferrugineous, shining, elevated, with a median furrow, dull grayish in front above the antennæ; a yellow spot on each side near the eye; two flat interrupted median stripes and on each side a larger flat shining spot.

Prothorax short, broader than long, narrowed before, front margin rounded; clothed on margins and behind laterally with short white villosity; dull yellowish, with two approximated median bands more visible before the furrow, and on each side with a broader dark fuscous band more visible after the furrow; thorax dull pitchy, obscurely margined with dull yellow; besides, below the wings pitchy with a few yellow spots.

Abdomen shorter than the wings, luteo-fuscous; posterior margin of segments, and sometimes a faint middle line, yellow.

Genitals of male and the last segment black, below a row of strong black spines; an inferior conical part with long black hairs; abdomen of female shorter, the superior parts blunt, below a row of black bristles; two small appendages (probably) inferiors.

Legs yellowish, not very short, the intermediate finely sprinkled; femora and tibia darker inside, except in the middle pair; tibia with an apical dark ring; tarsus about longer than tibia, tips of joints darker; spurs scarcely as long as first joint, straight, dark.

Wings hyaline, moderately pointed; pterostigma small, milk white, a small dark dot before it; venation pale, median and submedian veins distinctly interrupted with fuscous; costals simple.

Length of body, ♂ 30, ♀ 26 mm.; exp. al. 54 to 60 mm.

Hab.—New Mexico (formerly W. Texas), Pecos River, August 4th, Capt. Pope's Exped.; Mexico, Matamoras, same expedition.

THE ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held in the City Hall, Ottawa, on Friday and Saturday, October 5th and 6th, 1888. A Council meeting was held on Friday morning at 10.30 o'clock in a Committee room of the City Hall, at which the following members were present:—The President, Mr. James Fletcher, Ottawa; Mr. E. Baynes Reed, Mr. W. E. Saunders and Mr. J. M. Denton, London; Rev. C. J. S. Bethune, Port Hope; Rev. T. W. Fyles, Quebec; Mr. James Moffat, Hamilton; Mr. H. H. Lyman, Montreal. After the transaction of routine business, the sum of $200 was voted to the Library Fund for the purchase of books and the binding of periodicals and pamphlets. An Executive Committee, to consist of the President, the Editor, the Secretary-Treasurer and the members of the Council resident in London, was appointed to deal with the financial affairs of the Society and to provide for the representation of the Society at the annual meeting of the American Association for the Advancement of Science. The work of arranging the Society's collections and putting them in good order was directed to be

continued, and Mr. Moffatt was requested to do for the Coleoptera what he has already so successfully accomplished with the Lepidoptera.

In the afternoon the Society met at 2 o'clock. Mr. W. H. Harrington was present in addition to those above mentioned. Mr. Lyman exhibited a series of specimens of the different species of *Callimorpha* which he had described in his paper last year (C. E. xix., p. 181) and remarked upon their various peculiarities. He thought it most desirable that names should be attached to the different varieties, even though they may hereafter be found to belong to the same species. Messrs. Fletcher, Fyles and Moffat made remarks upon the subject, and agreed that all distinct forms should have separate names.

Mr. Fletcher gave an account of his visit to Nepigon, Lake Superior, early in July, in company with Mr. S. H. Scudder, of Cambridge, Mass., for the purpose of collecting the eggs of various rare species of butterflies. He described the various modes they had employed in order to induce the females to deposit their eggs, and recounted the great success achieved in securing the eggs of no less than seventeen species of butterflies and capturing a number of others.

Rev. Dr. Bethune exhibited a number of specimens of *Colias eurytheme*, chiefly of the form *eriphyle*, which he had taken at Port Arthur on the 1st of September last, and gave an account of his trip to the Nepigon River, exhibiting a large number of specimens of butterflies and other insects captured there on August 21st, 22nd, and 30th. Among these may be especially mentioned *Colias interior* and *eurytheme*, *Argynnis electa*, *atlantis*, *chariclea* and *bellona*, *Phyciodes tharos*, *Grapta faunus* and *progne*, *Pyrameis huntera* and *cardui*, *Limenitis arthemis*, etc.

Rev. T. W. Fyles read a paper on *Chionobas Jutta*, in which he recounted his success in rearing the insect through all its stages.

Mr. Fletcher and Dr. Bethune spoke of the desirability of issuing a series of papers on popular and economic entomology in the CANADIAN ENTOMOLOGIST, and urged upon the members present the necessity of co-operating in the work. The Editor also drew the attention of the meeting to the duty of at once providing the material required for the Annual Report of the Society.

The President laid on the table specimen sheets and plates of Mr. Scudder's great work on the Butterflies of the Eastern States and Canada, which were examined by the members with much interest. He also

brought up for discussion the subject of the disease known as "Silver-top" in hay, which is believed to be caused by a species of Thrips, and requested the members to investigate the matter in their various localities. The only remedy at present suggested is the plowing up of old hay-fields which are found to be the most seriously attacked. The depredations of Grasshoppers during the past season were next considered. Mr. Fletcher suggested that much might be done to reduce their numbers by cutting the hay about the 20th of June, if practicable, and thus preventing the maturity of the insects by depriving them of their food before they were able to fly to a distance for it. Mr. Denton reported that the Chinch Bug had been observed in the Township of Delaware, near London, and that it was likely to become very injurious if measures were not taken to counteract it.

The meeting adjourned at 5.30 p.m.

EVENING SESSION.

In the evening the Society held a public meeting in the Council Chamber of the City Hall at 8 o'clock, at which there were about sixty persons present, including the Hon. C. W. Drury, the recently appointed Minister of Agriculture for Ontario; Mr. John Lowe, Deputy Minister of Agriculture for the Dominion of Canada; Prof. Saunders, Director of the Experimental Farms of the Dominion; Sir James Grant, M.D.; Mr. R. B. Whyte, President of the Ottawa Field Naturalists' Club; Mrs. Macleod Stewart; Mrs. R. B. Whyte, Mrs. Davidson, and several other ladies as well as a number of farmers and gardeners from the city and neighbourhood.

The proceedings of the evening began with an able and practical address from the President, Mr. James Fletcher, of Ottawa, upon "Insects Injurious to Crops." (The address will be published in full in the Annual Report of the Society.) The speaker stated that it was a well-known fact that at least one-tenth of all the crops grown in this country was destroyed by noxious insects. In order to combat these insects it was necessary to know their life-histories, and to acquire and disseminate this knowledge was the main object of our Entomological Society. He described in simple terms the two systems of structure in insects, in accordance with which one class live by sucking out the juices of plants and the other by biting and gnawing the substance, and related the various means adopted to counteract the ravages of each. In his position as Dominion Entomologist he found it possible to give to nearly

all enquirers useful information about the insects that might be affecting their crops or gardens. He then referred to many common injuries and related the best means of dealing with them, and gave an account of what might be termed the "first-class pests" of the season, among these he specially mentioned the cut-worms and grass-hoppers, which had been more than usually numerous and destructive in many parts of the Province. He concluded his address, which was listened to with great interest and attention for upwards of an hour, by expressing the pleasure it gave to the members of the Society to observe the growth of their science in popularity, a fact evidenced by the attendance that evening of so many distinguished persons.

The Hon. C. W. Drury next addressed the meeting. He said that he had not come to deliver a speech, but he had travelled five hundred miles in order that as the head of the Agricultural Department of Ontario he might show the importance which the Government he represented attached to the work of the Entomologists. He considered that the small grant annually made to the funds of the Society was amply repaid by its practical work, and mentioned as an instance the immense saving to the country effected by the discovery of the remedy for the clover-seed midge

Sir James Grant spoke in graceful terms and delivered a very interesting address. He described the importance of Entomology in its various aspects, and referred to the work of some of its greatest masters, from Aristotle and Pliny, in ancient times, to LeConte, who had described so enormous a number of species of beetles and whose lamented death was so great a loss to science. He described its relation to other departments, especially to medicine, and mentioned as an instance the fact that bacteria had been introduced into the blood by the bite of mosquitoes. He paid a high compliment to the President for his practical and interesting address, and for his enthusiastic devotion to the science which had deservedly won for him the recognition of the Dominion Government.

Professor Saunders rose to move a vote of thanks to the President for his valuable address. He gave a short account of the history of the Society and its work, and mentioned the fact that there were only two of the original members present besides himself, viz.: Dr. Bethune and Mr. E. Baynes Reed, who had been concerned in its organization twenty-five years ago. Sir James Grant seconded the vote of thanks, which was put to the meeting by Dr. Bethune and unanimously carried.

Rev. Dr. Bethune then proceeded to give a brief address, in which he strongly urged the importance of encouraging young people in their instinctive fondness for collecting insects. It was not only a most useful pursuit from an educational point of view, but led to great results in developing a love for science and a steady increase in the number of its votaries. As one of the pioneers of the Society he was delighted to see for the first time at one of its meetings the Provincial Minister of Agriculture and also the Dominion Deputy-Minister; he expressed his pleasure also at the presence of so many ladies, and trusted that they would bring to the aid of Entomology all those gifts of deftness and neatness which they so eminently possessed. For their encouragement he mentioned that the most distinguished entomologist in England at the present time is a lady, Miss E. Ormerod, of St. Albans.

In acknowledging the vote of thanks, Mr. Fletcher took occasion to refer to one point which he had overlooked, namely, the injuries inflicted by "that miscreant, the English sparrow," whose extermination he strongly advocated. The Hon. Mr. Drury stated that this destructive bird was no longer under the protection of the Act of Parliament respecting insectivorous birds, and that everyone was at liberty to aid in reducing its numbers. The meeting then adjourned.

SATURDAY'S SESSION.

Saturday, October 6th.—At 10 o'clock a. m. a meeting of the Council, was held for the transaction of business, and after its adjournment the Society continued its proceedings. The reports of the Secretary-Treasurer, the Librarian, the delegate to the Royal Society of Canada, the Montreal Branch, and the delegates to the Entomological Club of the American Association for the Advancement of Science were presented and adopted.

The following gentlemen were elected officers for the ensuing year:—

President—James Fletcher, F.R.S.C., F.L.S., Ottawa.

Vice-President—E. Baynes Reed, London.

Secretary-Treasurer—W. E. Saunders, London.

Librarian—E. Baynes Reed, London.

Curator—Henry S. Saunders, London.

Council—J. M. Denton, London; J. Alston Moffat, Hamilton; Gamble Geddes, Toronto; W. H. Harrington, Ottawa; Rev. T. W. Fyles, M. A., South Quebec (and the former Presidents, who are ex-officio members

viz., Prof. Saunders, F.R.S.C., F.L.S., F C.S., and Rev. C. J. S. Bethune).

Editor of the CANADIAN ENTOMOLOGIST—Rev. C. J. S. Bethune, M.A., D.C.L., Port Hope.

Editing Committee—The President, Prof. Saunders, J. M. Denton, H. H. Lyman (Montreal), Dr. W. Brodie (Toronto).

Auditors—J. M. Denton and E. B. Reed.

Delegate to the Royal Society of Canada—H. H. Lyman, Montreal.

Papers were read by (1) the Rev. T. W. Fyles on "The Hypenidæ of the Province of Quebec;" (2) Mr. J. A. Moffat on "Some Curious Proceedings of the Larvæ of *Euchætes egle* Feeding upon the Milk-weed;" (3) Mr. W. E. Saunders on the English Sparrow, strongly recommending its extermination; (4) Rev. T. W. Fyles on "The Sphingidæ of the Province of Quebec." Mr. Fletcher, in discussing this paper, remarked upon the colours of *Sphinx 5-maculata*, and said that the dark forms seemed to be hardier than the pale green; he had observed also in *Papilio asterias* that some green pupæ emerged much sooner than the brown; he had obtained no less than four broods of this insect this year. (5) Rev. T. W. Fyles read "A Memoir of the late Philip H. Gosse," and exhibited a photograph of this eminent naturalist and his late residence. (The above papers will all be published in the annual report of the Society.)

Mr. Moffat stated that he had taken *Papilio cresphontes* this summer at Hamilton, and that he had seen in that neighbourhood a specimen of the now rare *Pieris protodice*. Mr. Fyles mentioned that he had taken *Grapta gracilis* and *faunus* at Quebec in September, *Hepialus gracilis* in the Township of Dunham, and *Hepialus auratus* in the Township of Brome. Dr. Bethune had found *Grapta J. album* numerous at Port Hope in September, and brought some living specimens to the meeting; these will be taken care of during their hibernation, and efforts will be made to obtain their eggs in the spring.

The following gentlemen were elected members of the Society:—Rev. Prof. Symonds, Trinity College, Toronto; Rowland Hill, London; Mr. Brown, *Free Press*, London; A. L. Poudrier, Donald, B. C.; Arthur M. Bethune, Port Hope; E. M. Morris, Toronto.

It was decided to hold the next annual meeting in London immediately after the close of the meeting of the American Association in Toronto in August.

After passing a vote of thanks to the Mayor and Council for the use of the City Hall the meeting adjourned.

BOOK NOTICES.

ENTOMOLOGY FOR BEGINNERS, for the use of Young Folks, Fruit Growers, Farmers and Gardeners. By A. S. PACKARD, M. D. New York: Henry Holt & Co.—1 vol., 8 vo., pp. 367.

It is with much pleasure that we draw the attention of our readers to the publication of this work. For many years past, we have been repeatedly asked to recommend some book that would serve as an introduction to the study of Entomology, and enable young collectors to make a satisfactory beginning in the pursuit. Hitherto, we have been unable to mention any single work that would answer the purpose, and we have felt constrained to tell enquirers that they must procure several books, for instance, Kirby & Spence's Entomology, Harris's Insects Injurious to Vegetation, etc., and even then not have what they want. Dr. Packard's new book is certainly one that has long been wanted, though we fear that it is a little too technical in its language, and too abtruse in its treatment of some of the subjects to exactly meet the requirements of beginnerst We think, too, that the author has not been judicious in the arrangemen. of the matter; the first two chapters on the structure of insects and their growth and metamorphosis will, we fear, prove rather repellant to one who has collected a few specimens and wants to know something about them and what to do with them. They are carefully written, and give an admirable summary of what every student of Entomology requires to know; but they are a little beyond the youthful mind, or the uninstructed powers of the ordinary farmer. We, therefore, strongly advise all beginners who procure this book—and we recommend them to get it without fail—to commence their reading with Chapter vi., which contains very interesting and useful directions for collecting, preserving and rearing insects; they might then turn back and read Chapters iv. and v. on insect architecture, and insects injurious and beneficial to agriculture. By this time, we have no doubt, they will have become so deeply interested in the work that they will not be discouraged by the drier details and the harder words in the remainder of the book. The third chapter, which fills over a hundred pages, gives an admirable synopsis of the classification of insects, and should enable a beginner to arrange with some degree of system any specimens that he collects. The author has departed from the usually received divisions of insects, and sets forth no less than sixteen orders; this number he obtains by sub-dividing the Neuroptera, Orthoptera and Diptera. To the new orders thus formed, he applies the novel terms Plectoptera, Platyptera, Mecaptera, etc. We feel rather doubtful about their general acceptance, and think it a pity that they should have been put forth in an elementary work of this kind before they had been dis-

cussed and approved of by Entomologists in general. We do not, however, wish to disparage the work ; it is certainly a valuable compendium, and we cordially recommend it to our readers who are beginners in Entomology. The book is well written and excellently illustrated throughout, and must prove a great help to the science by furnishing young students, in a convenient form, with information that hitherto they could not readily procure. C. J. S. BETHUNE.

THE BUTTERFLIES OF THE EASTERN UNITED STATES AND CANADA, with special reference to New England, by S. H. SCUDDER. Imp. 8 vo. Cambridge, pp. 1–40 and 105–208, Part I, 1st Nov., 1888.

For some months Lepidopterists and Librarians have been anxiously awaiting the appearance of Mr. Scudder's monumental work on the Butterflies of New England, which, as is well known, has been constantly engaging the attention of this keen observer and careful student for the last 20 years. Through the courtesy of the author we have been favoured with advance sheets and plates of Part I, which is to appear on 1st Nov., 1888. From the well known high character of Mr. Scudder's past work, doubtless much will be expected by the scientific world of this long promised book. Judging from the number under consideration we believe few will be disappointed. No work has ever appeared, in any branch of science, where such thorough and complete information is given of the objects discussed, nor which has been so copiously and accurately illustrated. An Introduction treats, with the greatest detail, of the general structure of butterflies from the egg to the imago, and includes a chapter upon their classification. This is followed by a systematic treatise in which "not only every species," (embraced within the scope of the work) "but also every genus, tribe, sub-family and family is described and dis-"cussed with a fullness never before attempted, except in individual "cases, including in each instance not merely the perfect form, but, when "possible, the egg, the caterpillar at birth and in the succeeding stages, "and the chrysalis, together with the distribution, life-history, habits and "environments of the insect, in which a great accumulation of new facts "and observations is embodied."

In the Part before us we have pages 1 to 40 of the Introduction covering the structure of the egg, the caterpillar and the chrysalis, and the beginning of the description of the perfect insect. There is then a break and the pagination continues again at page 105, where the second section

begins with a short chapter on the families of butterflies. This is a reproduction, slightly altered, of the table of classification which Mr. Scudder has already published in the CAN. ENT., xix., 201, in which he divides the butterflies into *Nymphalidæ*, *Lycaenidæ*, *Papilionidæ* and *Hesperidæ*, an arrangement virtually the same as that given by Bates and adopted by Packard, in which the genera *Œneis* and *Cercyonis* are considered the highest of the butterflies.

At page 109 the systematic treatise begins with the *Nymphalidæ* or "Brush-footed butterflies." With this family, as with sub-families and genera throughout the work, when possible analytical tables are given for their arrangement, based upon the egg, the caterpillar at birth, the caterpillar at maturity, the chrysalis and the imago. The first sub-family is the *Satyrinæ*, including six genera, of which *Œneis* is described first. Under each species we find first complete and careful technical descriptive details of structure for all the known stages. These are printed in rather smaller type than the rest of the book, a fact which will considerably facilitate reference. Then follows a general description, giving any interesting features in the distribution and habits of the perfect insect and larva, the food plant, variations and enemies, and lastly a list of the points upon which further information is needed.

On page 127 appears the first of a series of essays, of which there are to be over 70 distributed throughout the work, and to which the author has applied the somewhat inelegant title of "Excursuses." These discuss separately all the interesting problems which arise in the study of butterflies (whether of distribution, structure, history, or relation to the outer world), in themselves forming a complete treatise on the life of these insects. These will be a charming feature of the work by means of which a book, which must necessarily contain a large amount of technical scientific description, will be made attractive to many who will subscribe to it merely to possess the most extensive and beautiful book which has ever appeared on the diurnal Lepidoptera of North America. The scope of these may be inferred from the titles of those which occur in the first part.

1. The White Mountains of New Hampshire as a home for butterflies.
2. The clothing of caterpillars.
3. The general changes in a butterfly's life and form.
4. The eggs of butterflies.
5. The modes of suspension of caterpillars.

The species described in the first part are *Œneis semidea* and *Œ. jutta*, *Cercyonis alope* and *C. nephele*, *Enodia portlandia*, *Satyrodes eurydice*, *Neonympha phocion* and the beginning of the description of the genus *Cissia*.

The nomenclature, we are told in the prospectus, follows the rules of the American Ornithologists' Union. As is well known Mr. Scudder's views upon some points with regard to nomenclature are very extreme, and it must be conceded that he has so far few followers. This state of affairs, however, we anticipate will be changed. After many years of close study upon a special subject by so able a student, the writer, at any rate, is prepared to weigh carefully, without previously condemning them, his views as expressed in this his greatest work.

The illustrations are, as above stated, most profuse, superbly executed, and each is accompanied by copious explanatory text, which will be bound opposite each plate.

The eight plates in Part I. are as follows: No. 1 is a beautifully coloured chromo-lithograph of butterflies, showing in most instances both the upper and lower sides. The complete work will contain about twelve of these plates. The second plate, No. 14, is uncoloured, but is exquisitely engraved, and by some may possibly be preferred to the last. It shows seventeen figures of butterflies artistically grouped. There are to be five plates similar to this. The next plate, No. 18, comprises eight small maps, showing separately the distribution of the different species treated of in Part I. There will be fifteen of these sets of maps. No. 46 shows scales of butterflies, and there will be six of this nature. No. 52 gives the heads of butterflies. The work on this plate, drawn by J. H. Emerton, is very beautiful. There are to be eight others like it. No. 67 is the first of three plates showing the micropyles of eggs magnified highly. No. 70 is devoted to magnified figures of young larvæ just after leaving the eggs, and there will be three others like it. No. 93 is a physical map of New England, prepared specially for this work by John H. Klemroth, under the supervision of the Geographer of the U. S. Survey. These, however, do not by any mean exhaust the styles of plates which will appear, for in subsequent numbers new sorts of subjects will come forward, all of which will be fully illustrated whenever figures can make the text more intelligible. Special articles upon hymenopterous and dipterous parasites are to be prepared by the able specialists, Messrs. L. O. Howard, of Washington, and Dr. Williston. In fact, all the phases of life passed by the insects treated of as well as the important circumstances connected therewith, will be presented to the reader in the most complete manner possible. There will be about two thousand figures on ninety-six plates, of which over forty will be coloured. The small inconvenience of not always having all the plates referred to in the text issued at the same time with it, cannot of course possibly be obviated in a systematic work, where everything is treated fully in its proper place under each species, and in which the number of subjects needing illustration in each part is greater than can be shown on the quotum of plates for that part. The whole will be issued in a year, in 12 parts, each to contain 8 plates and about 150 pages of text.

JAMES FLETCHER.

The Canadian Entomologist.

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THE CLASSIFICATION OF THE BOMBYCIDÆ.

(Fourth and Last Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Sub-family *Attacinæ.*

The subfulcate primaries ally this group to the *Platypteryginæ*, and a certain vague resemblance to the *Geometridæ* may be found in the tendency which the upper surfaces of the wings show to display the same pattern on both wings. The ocelli are absent, the oral structure undeveloped, the hind wings are without frenulum. The species form mostly large cocoons, and the characteristics of the family are pronounced in this sub-family of silk-spinners. The male antennæ are feathered to the tips, each joint bearing a double pectination. The antennæ are comparatively short; in the female the pectinations are shorter. On the fore wings, vein 5 is much closer to 6, than to 4, arising from the upper corner of the cell. The caterpillars are thick and short rather than long, the segments tending to become centrally elevated, with prominent incisions. In the early stages they are bristled; in the later stages of *Platysamia* and *Saturnia*, for instance, characteristic colored warts appear. They are almost polyphagous. Long lists have been given by Mr. Beutenmuller, of the food plants of our common North American forms. Our beautiful *Actias luna* has an Asiatic ally in *A. selene*, and, I conclude, that the genus *Actias* in our fauna must be regarded as a relic of a former Arctic, circumpolar fauna, the more so as it is seen to be absent south of the equator in the New World. Leach's genus *Actias* is older than *Tropæa* of Hübner, which Dr. Packard used, hence I retain it in my Check Lists. We have in California, and again in Texas, species of the European genus *Saturnia;* I have elsewhere drawn attention to the fact that there exists a certain resemblance between the two faunæ, of which this is an instance.

Sub-family *Hemileucinæ*.

Whereas the *Attacinæ* spin thick cocoons above the surface, and have subfalcate primaries, in this group, so far as I have studied them, the fore wings are blunt or rounded, and the cocoon is made at the surface of the ground mixed with *debris*. The caterpillars in their last stage are bristled, and resemble those of *Platysamia* in their earlier stage. This group, represented by the typical genus *Hemileuca*, prepares us for the following *Ceratocampinæ*, in the gradual modification of its characters. In its closely allied species and tendency to local modification it recalls such lower genera as *Clisiocampa*. Perhaps the genus *Quadrina* belongs here; of this I have had only a single specimen to examine. When both sexes are known and nearer comparisons are made it may be that we have to do with a distinct sub-family type. Mr. Smith, after seeing the type, referred it to the *Cossinæ*. I do not believe this, or that we have to do with an internal feeder. Later, he appears to have reverted to my original idea that the genus was related to *Gloveria*, referred by Dr. Packard to the *Lachneinæ*, perhaps from its resemblance to the European *Otus*. The eggs of *Hemileuca* are laid like those of the *Lachneinæ*, in ring-form, and the abdomen is likewise tufted at the extremity.

Sub-family *Ceratocampinæ*.

In this group, defined by Harris, a cocoon is rarely made and the transformation is subterranean. The female antennæ are sub-simple or simple, and the male antennæ are not pectinate at the tip. The abdomen is longer, the squamation smoother, and, while the main Attacid characters are still retained, there is an evident departure in a fresh direction. The ocellate marks on the secondaries are here and there apparent, but the ornamentation has become simpler, and the lowest form, *Dryocampa rubicunda*, has a resemblance in all stages to the ensuing *Lachneinæ*. The caterpillars are often bizarre in appearance from the spines and horns with which they are ornamented, especially in the genus *Citheronia*, where they probably serve as a defence by frightening their different enemies. There seem to be two groups of larval types, the extremes of which are displayed by *Eacles* and *Citheronia;* the larvæ of the *Eacles* type, approaching the preceding Attacid type, those of the *Citheronia* type approaching gradually the *Lachneinæ*. The distribution of this sub-

family is somewhat limited. It appears to be American, and to be confined to the plains east of the rocky backbone of the continent from north to south. In our fauna it seems to be a southern element. Hübner calls this group *Communiformes*. Perhaps he intended thereby to indicate a return to the more usual moth form, the fore wings tending to become narrower, the secondaries subordinating, the abdomen lengthening. I have in my "Hawk Moths" alluded to the probability that the Hawk Moths may be a further offshoot from the Lepidopterous stem in a parallel direction with the *Ceratocampinæ*.

Sub-family *Lachneinæ*.

In this group there is a return to the normal moth form with a tendency to the lengthening of the abdomen noticeable in the caterpillars. This lengthening of the abdomen and a certain weakness in structure dependent upon this lengthening, seems to be indicative of lower rank in insects generally and in the several suborders. The moths of the *Lachneinæ* resemble preceding groups in the absence of ocelli and frenulum. The hind wings are subordinate to the primaries, the colors mostly of shades of brown and gray, with oblique transverse bands, more or less broken. The palpi are more prominent than in the preceding groups, the tongue remaining weak. The ornamentation of the long-bodied caterpillars consists of tufts of hair. Our North American fauna is poor in species. We have two genera derived from a former circumpolar fauna, also found in Europe, *Clisiocampa* and *Gastropacha*. We have, then, two genera which seem to me of South American extraction, *Tolype* and *Artace*. The species of *Clisiocampa* are very closely allied. They offer ground for the correctness of the view which I have expressed that in North America, species tend to vary, to throw off local, perhaps, what Walsh called phytophagic varieties or species. The wide extent of country, with its differing climate and flora, inhabited by *Clisiocampa*, has led to the throwing off of specifically appearing forms, which may have hardened in most cases into true species, separable in nearly all stages by external characters. An instance is offered also by *Datana*, which I regard as an offshoot from *Phalera*; while there are only two species of *Phalera*, there seem many closely allied species of *Datana*. The eggs are laid in a ring-form on twigs, and the caterpillars of *Clisiocampa* are well-known as enemies by the orchardist.

Sub-family *Cossinæ*.

The larva and moth are long-bodied, and this group is characterized by the former being internal feeders. They are brown and livid in color and coleopterous-looking, as are internal feeders generally, belonging to whatever order of insects. They have this habit in common with *Castnia*, and *Sesia*, but this has probably survived, while the other characters have differentiated so that we cannot consider the habit as uniting them in a modern family. The female *Cossus* has an external ovipositor, which is an index for the habit of the caterpillar. The ocelli are wanting and the tongue is quite rudimentary. The male antennæ are pectinate, the wings are somewhat narrow and the habitus is sphingiform. I have watched the exclusion of *Cossus* from the cocoon, the very active and moveable chrysalis being forced out into the air before the shell is broken. Dr. Bailey gives a good account of the transformations of Bailey's Goat Moth, *Cossus centerensis* of Lintner. We have representatives of the European genera *Cossus* and *Hypopta*, while *Prionoxystus robiniæ*, the Locust Goat Moth, seems to me decidedly a distinct form of North American origin.

Sub-family *Hepialinæ*.

In this group we have, without a doubt, the lowest Spinners. The long thorax, with its subequal metathorax, draws the insertion of primary and secondary wings apart. The subequal wings with pointed tips and the 12-veined secondaries, the short antennæ, spurless tibiæ are suggestive of the Neuroptera. The distribution of the group is very general throughout the world; and this fact, together with the striking structural resemblance of its members, leads us to believe we have to do with an old and long preserved type of moth. The caterpillars are root feeders, like those of the *Cossinæ*, sixteen footed, naked, yellowish. The eggs are remarkable for their fineness, looking like gunpowder. The cocoon is subterranean, a cell lined with silk. We have very fine species in North America, referred by Dr. Packard to *Sthenopis*, but which, notwithstanding their size, seem to me congeneric with the European *Hepialus humuli*. The limits of the genus may be reached with the beautiful *H. auratus*, which has a structural ally figured by Herrich-Schæffer from Brazil. The species are generally rare; the moths fly in the dusk of evening and are an object of interest with most collectors.

So far we have gone over the principal features of the *Bombycidæ*, more in explanation of the sequence adopted by me in the Check Lists, and which is that of Dr. Packard's Synopsis of 1864, than in any attempt to re-classify the family. But Dr. Packard gives no definitions of the higher groups, and the diagnoses of the new genera do not include certain structural characters, as, for instance, the neuration. I cannot here attempt to limit the genera, and I only give the characters which render the higher groups more or less recognizable. The neuration must be comparatively studied. As a whole it seems to me to show characters of simplicity. The cells are generally open; there is an absence of accessory cells and crowding of veins, such as we see in some other familes of moths. We can believe that the *Sphingidæ* may have been thrown off from the same stem when we compare the neuration. Other characters, such as the absence of ocelli, may be additional indices. In the *Noctuidæ* the ocelli are quite rarely absent, in the Geometridæ quite rarely present. But they appear in some sub-families of *Bombycidæ*, though not in the lower ones and in the more typical Spinners, such as, I think, stand nearer to the Hawk Moths. The *Bombycidæ* are, as we find them now, detached groups with very diverse resemblances to other now distinct families of Moths. In this diverse resemblance lies the proof of the synthesis which the Spinner Moths present. To detach the different sub-families which we have here discussed is to lose sight of some of those finer questions of relationship which a close study of these insects calls up. No family of Moths is more interesting to the student on this account than the *Bombycidæ*, with its great diversity of structure, appearance and habit. To the collector the beauty of the moths, their bright colors, the soft shading, the size of most of the species is equally tempting, while to the practical mind, the fact that the silk-worm, *Bombyx mori*, and other silk-producers, belong to the *Bombycidæ*, must render the pursuit of these insects sufficiently attractive. They live short lives, the incomplete mouth parts render food-taking to many kinds an impossibility; they live so long as caterpillars or chrysalids, and lay their eggs and die. But the human mind seizes upon the many considerations, which it has evolved from a study of the facts presented by these creatures, and turns them to its profit or its pleasure.

NOTES ON DANAIS ARCHIPPUS, Fabr.

BY MISS EMILY M. MORTON, NEW WINDSOR, N. Y.

Having been requested by my friend, Mr. Wm. H. Edwards, to make observations on *Danais Archippus* during the seasons of 1887 and 1888, and subsequently having written to him the result of such observations, he requested me to publish in the Canadian Entomologist the substance of what I had already written him in my letter. I wrote out a paper about July 5th, which, however, was lost in the mails, and the paper now sent is a partial copy of the original, though somewhat altered, as the first was over four months old.

All my observations were made in New Windsor, N. Y., which town is situated on the banks of the Hudson, directly opposite the hills which bound the northwestern borders of Connecticut.

Archippus is not more rare with us than many of our hybernating butterflies, and seems to me in no way abnormal.

It has always appeared when a certain Persian-lilac bush blooms, flying over and alighting on the blossoms.

Last summer (1887), the first hybernators came, as has already been stated by Mr. Edwards, May 3rd and 4th; this season everything being later with cold rains and high winds, the lilacs did not blossom out until May 10th, when *Danais Archippus*, (how I love the dear old familar names!) allured by the first warm sunny day, and the perfume of the opening blossoms came forth to drink of the nectar, and having refreshed herself, hastened away to deposit her eggs before her few remaining days are gone, and she is gathered to her forefathers. This butterfly could not have been a "colonist," for nothing so frail could have flown any distance in the high wind and beating rain of the preceding day, and it was not later than 9.30 a. m., the flowers and leaves still heavy with rain, so she must have come from a very short distance—possibly from the ruins of an old shed a hundred yards or so from the bush.

Has any one ever found a hybernating Archippus? Yet, we all know they do hybernate.

In the earlier days of my collecting, many and many a stump has been peeled of its bark, and even split to satisfy the craving for something new, yet never an Archippus has rewarded the most untiring search in that direction, though once, and in early May too, a *Vanessa Antiopa*, torpid,

though still alive, was revealed in the very centre of a stump cosily mixed up with the damp saw-dust left by the ants and other borers.

An egg of Archippus is a very tiny thing, and not easily found, even when sought for, and as Mr. Edwards says, "there are thousands of Asclepias plants to one Archippus butterfly," especially a successfully hybernated butterfly, as probably not one in ten of the hosts of September and October flies live to leave their hybernacula in the spring.

How many people have found eggs of *Hemaris Thysbe?* Yet in most places Thysbe is as common as blackberries, and the larvæ are often to be found on the snow-ball bushes, though not one in a dozen ever reaches maturity. Once I spent an hour looking for the egg which I saw Thysbe deposit on a tiny bush which might have been covered by a three quart pail, yet had to depart without it in the end.

Mr. Marsh, though an unusually intelligent and original observer, only succeeded in finding one egg, which goes to prove that Archippus eggs are harder to find than the larvæ or butterflies.

Mr. Fritz Senff, another very intelligent and accurate observer, though a recent acquisition to our small band of students and collectors, tells me he saw two perfectly fresh examples of Archippus, July 3rd and 6th, one flying in the veranda of his home in New Windsor, the other, which he caught, in a field not far distant; these were, doubtless, the first brood from the eggs of the hybernators; besides these, we saw while driving June 19th, 1888, five or six examples, none of which were broken or faded, though we were not near enough—that is, we had none in our hands, so as to be able to distinguish that rich plum-like bloom so dear to the collector of cabinet specimens, but which no butterfly ever carries having once flown even "for a few short hours."

Every collector or exchanger well knows how perishable is that same bloom, and how utterly different is any hand-raised specimen, from a poor wind-blown, grass-scratched passé imago, or even one who has dragged its undeveloped wing through the sharp blades of grass to find a resting place whereon to expand them.

Surely *Archippus* is one of the most perishable species, for the "bloom" is as ephemeral as the dew of a summer morning, or the purple down of all the Hemaris tribe; one slight breath and it is gone forever!

As to any species laying "for a month or so," what collector or breeder

of any lepidopterous insect has ever known any species to live and deposit eggs for two weeks—to say nothing of "a month or so?"

In most of the Heterocera five days is the usual period of life after the ♀ has paired. Every collector of course knows that most species will live longer if kept from their mates, which is a provision of nature to prevent the extermination of species. A *Phobetron pithecium* accidentally kept from her mate lived eight days, mating the fifth; another mating the first day from pupa deposits her eggs and dies the fourth day.

I am no friend to the theory of colonization, though of course, I know eggs and pupa are often brought to and from distant countries in the commerce of nations; but that anything so fragile as a butterfly or moth should fly hundreds of miles, and not only that, but entirely change its habits on its arrival, even though that country should be nearly identical with its own in climatic properties, becoming from a double or three brooded species a single one, seems out of all reason.

That a hybernating Archippus should be more or less shabby, according to its hybernacula, is of course, highly probable; and, I agree with Mr. Edwards, in judging that a freshly hatched butterfly, finding a cold dry place wherein to hybernate, should appear in the late spring, less faded and unstained than another in a wet and exposed situation; but that any should appear after the wear and tear of a northern winter, or a flight of an hundred miles with the glorious hues of an imago fresh from chrysalis, is utterly beyond belief.

This season, after an unparalleled winter, the first "western blizzard" ever experienced in the State of New York, we have had swarms of hybernated *P. Atalanta;* one would not suppose there were enough nettles in the whole of New Windsor to afford nourishment to the hundreds which have appeared during the month of May. Did they fly from the Gulf of Mexico? *Quien sabe?*

A curious variety of *Papilio turnus* was found here in New Windsor, closely resembling fig. 3 in plate 5 of Mr. Edwards's Butterflies of North America. She was taken in the grass July 8th, but could not fly as her wings were crippled on one side. She is darker than Mr. Edwards's specimen, looking like a *Glaucus*, but with a powdering of yellow scales covering the inner surface of all the wings. Could the blizzard of the 12th of March have produced this variety?

October 29th, 1888.

THE CHALCID GENUS RILEYA.

BY WM. H. ASHMEAD, PHILADELPHIA.

My good friend Mr. Howard, in his article entitled "The Chalcid Genus Rileya," published in the October CAN. ENT., p. 191, makes several inaccurate statements; and, in the lines "An interesting interference in the adoption of the generic name Rileya has recently taken place between Mr. Ashmead and myself," implies that I knowingly appropriated this name for a genus in the *Eurytominæ*, after he had decided to use it for one in the *Encyrtinæ*, when I had no such knowledge, thereby placing me in an unenviable position before my colleagues.

For the guidance of those who will have to settle this question, I must state that my description of the *Eurytomid* genus Rileya was drawn up and forwarded to Prof. E. A. Popenoe for publication about the last of November, 1887, and a synoptic characterization of the genus appeared in the *Entomologica Americana* for June 1888, although the full description of the genus was not published, as stated by Mr. Howard, until afterwards—about July 5th, one month later; still, both of these descriptions were published three or four months ahead of Mr. Howard's.

The opinion, expressed by Mr. Howard, that because the name Rileya is given in my synopsis of the Eurytominæ, "*not as a new genus, but as one already described, and the few words given to it in the table fail to sufficiently characterize it*," is a matter of surprise to me, for the characters given definitely separate it from all other Eurytomids, the characters are too unique among the *Eurytominæ* to be mistaken, and as to whether it was indicated as a new genus "has nothing to do with the case." I might have indicated the genus without my name, or in the usual way—nov. gen., mihi., *et cetera*, yet the genus would hold.

As I have before stated, I had no knowledge of Mr. Howard's intention to dedicate a genus to Dr. Riley, and I regret that such knowledge was withheld from me, so that a controversy of this kind could have been avoided. The first intimation that I had of his intention to do so was on receipt of my July number of the *Entomologica Americana*, received, I think, about July 12th, and several months after my description of the genus had been forwarded to Prof. Popenoe; and just one month after the publication of my "Revised Generic Synopsis of the Eurytominæ."

Mr. Howard's paper on Rileya n. g.. was not read before the Entomological Society of Washington until June 7th, 1888, and not 1887, as stated in the CANADIAN ENTOMOLOGIST; while my synopsis was at that time already published. If there is any "interference" in the adoption of the generic name Rileya, it is on the part of Mr. Howard.

Besides the above "facts," I would state that the types of my genus *Rileya* were shown to both Dr. C. V. Riley and Mr. H. G. Hubbard, at my home in Jacksonville last winter, and at that time Dr. Riley made no mention of Mr. Howard's genus *Rileya*, although he did desire, for reasons of his own, that if it were possible, the name of the genus should be changed.

It is unfortunate that Mr. Howard, in describing his new genus *Rileya*, failed to go over the European literature on the subject, for, both from his figure and description, it seems to be identical with Dahlbom's genus *Lonchocerus*, described in 1857, Ofversigt af Kongl. Vetenskaps-Akademiens Förhandlungar, vol. xiv., p. 293. Mr. C. G. Thomson, Hymenoptera Scandinaviæ, Tom. iv., Fasc. I., p. 116, in speaking of this genus, says:—"Abdomen globosum. Pronotum magnum. *Antennæ scapo et flagellum valde compressis;*" and on p. 130, in speaking of the scutellum:—"Scutellum *dense holocericeo-pubescens.*" These characters seem to be the essential characters of Mr. Howard's genus *Rileya*, the only real difference being in the shape of the head; but whether or not Mr. Howard's genus is identical is immaterial, my Eurytomid genus of the same name having the priority.

In seeking to suppress the genus Mr. Howard has violated all the well established rules of zoological nomenclature.

JOHN ABBOT, THE AURELIAN.

BY W. F. KIRBY, BRITISH MUSEUM, LONDON, ENGLAND.

In the August part of the CANADIAN ENTOMOLOGIST, pp. 149–154, I notice an article on this subject by my friend, Mr. Scudder, and I may, perhaps, be able to add some additional remarks.

The volume on Exotic Moths, published by Duncan in Jardine's "Naturalist's Library," contains (pp. 69–71) a short account of Abbot's life and works, and incorporates the notice by Swainson, to which Mr. Scudder refers. Swainson remarks, respecting the plates, "M. Francillon possessed many hundreds, but we know not into whose hands they have

as every volume bears the book-plate of "John Francillon." There are passed." I may say that this is evidently the set in the British Museum, 17 volumes (not 16); the first 15 bear the date 1792 on the printed title pages, and the two last volumes 1804 (not 1809). The contents are as follows:—

Vols. 1–4. Coleoptera.
" 5. Orthoptera, Hemiptera, Homoptera and Heteroptera.
" 6. Lepidoptera Rhopalocera.
" 7–11. Lepidoptera Heterocera.
" 12. Neuroptera, Hymenoptera.
" 13. Diptera.
" 14. Arachnida.
" 15. Myriopoda, Mallophaga, Acarina, Crustacea, Lepidoptera (transformations), &c.
" 16. Portrait, Orthoptera, Coleoptera (transformations), Lepidoptera (transformations).
" 17. Lepidoptera (transformations).

The drawings of transformations of *Lepidoptera* are rarely, if ever, duplicates of those published by Smith, sometimes representing a different variety of the larva of the same species; and they are nearly three times as numerous. There are only about a dozen drawings of transformations of *Coleoptera*. Among the lesser-known orders, there is little doubt that many species figured are still undescribed.

I fully expect that some of Abbot's correspondence will be discovered (of course, including his autograph), perhaps at the Antipodes, for Swainson left England towards the close of his life, and died, according to Hagen, in New Zealand, in 1856.

I am surprised that Mr. Scudder has not mentioned the volume of Abbot's Drawings presented by Edward Doubleday to Dr. T. W. Harris (Harris, Entomological Correspondence, p. 123). If this volume is the same as that said by Mr. Scudder to have been presented by Dr. J. E. Gray to Dr. Asa Gray, some error must have arisen. Possibly it came into Dr. Asa Gray's hands directly, or indirectly, from Dr. Harris, with an erroneous impression respecting the original English donor.

There are a number of specimens originally collected by Abbot in the British Museum, and probably in other collections. The Museum of the Royal Dublin Society (now known as the Dublin Museum of Science and

Art) contains a large series of bleached specimens of insects of various orders (*Lepidoptera*, *Neuroptera*, &c.,) which were not improbably collected by Abbot (Cf. some notes by Mr. McLachlan, Ent. M. Mag. x., pp. 227, 228).

NOTE BY MR. SCUDDER.—The small volume of paintings referred to by Mr. Kirby is in the library of the Boston Society of Natural History, and was not mentioned by me because the less said about it the better. It was picked up at a book shop, bears the date 1830, and though Doubleday paid seven guineas for it, it is certainly not the work of Abbot, but of a very inferior copyist—some of the paintings being the merest daubs. It has scarcely the least value. The notice by Duncan I had not seen, but I find that it adds nothing to the facts of Abbot's life. Either I have never seen the seventeenth volume of Abbot's drawings at the British Museum referred to by Mr. Kirby, or, if it concerns the moths only, may for that reason have taken no note of it. My memorandum of the dates must have been incorrectly copied.

ANNUAL MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

(Continued from page 198.)

Thursday, Aug. 16th.—The Club reassembled at 3.30 p. m. Papers by Mr. Clarence M. Weed on "The Parasites of the honey-suckle Sphinx, *Hemaris diffinis*, Boisd.," and on "The Hymenopterous Parasites of the Strawberry Leaf-roller, *Phoxopteris comptana*, Frol.," were read by the Secretary in his absence. Mr. H. Osborn read an interesting paper on "The Food-habits of the Thripidæ." Mr. Smith gave an account of the collection of Mr. D. Bruce, of Rockport, N. Y., which was chiefly made in Colorado; it is especially remarkable for the long series of specimens of many species of Lepidoptera. Among others he has *Chionobas bore* in great numbers from the Rocky Mountains, proving it to be distinct from *C. Semidea* of the White Mountains; also an immense series of *Colias eurytheme* in all its varieties, and numbers also of many species of Noctuidæ.

Friday, Aug. 17th.—The Club met at 9 o'clock a. m. A paper was read by Dr. D. S. Kellicott, on *Hepialus argenteo maculatus*, which he

succeeded in raising from larvæ obtained in Oswego County, N. Y.; it bred in the roots and stems of *Alnus incana*. Mr. Schwarz stated that he had taken the moth, near Marquette, Lake Superior, on July 29th, this year. Mr. Smith considered it to be quite generally distributed, breeding in oak, willow and poplar. Mr. H. Osborn read a note on the occurrence of *Cicada rimosa* Say., in Iowa.

Prof. O. S. Westcott, related the occurence of a large gathering of butterflies about the carcass of a dead dog at Port Arthur, in June last; one hundred and ten specimens were counted, chiefly consisting of *D. archippus* and some *L. arthemis*, *Colias* and *Melitæa*. In the same locality he captured, July 20 to 23, nineteen examples of *Melitæa*; of these one was *Nycteis*, and seventeen *Tharos*—eight of the form *Marcia*, and nine *Morpheus*. He next gave an interesting account of the numbers of *Lachnosterna fusca* and *gibbosa* taken at Maywood, Ill., by means of a trap attached to a street-lamp, during the months of May and June, 1887 and 1888. He also gave a list of 1192 specimens belonging to 65 species captured in his trap on the night of June 13th, 1888; of these 730 were *Agonoderus comma* and 204 *Lachnosterna gibbosa*.

Mr. Howard gave an account of some recent experiments made under Dr. Riley's direction at Washington, with kerosene emulsion as a remedy for white grubs, the larvæ of *Allorhina nitida*. He stated that the grass had died over large areas of the affected lawn, and the soil was full of the grubs. The affected portion was treated with kerosene emulsion diluted fifteen times with water and applied with an ordinary watering-pot; the ground was then kept saturated for some days with ordinary water from a hose. A month afterwards, on digging into the part treated, the grubs were found to have descended sixteen inches into the soil, and all had died. In the untreated parts the larvæ were all alive and only two or three inches below the surface. There was no injurious effect upon the grass, even when the emulsion was only diluted half as much. He considered that the experiment was entirely successful. In the discussion that followed, it was evident that this remedy is much too expensive for adoption on a large scale, and could only be of practical use on a lawn or plot of land of special value. Dr. Peabody stated that Prof. Forbes had found the kerosene emulsion entirely successful against the common white-grub *(Lachnosterna)*; but as its application cost at the rate of about $100 per acre, it was far too expensive for ordinary purposes.

The Club met again at 3 p. m. Mr. Fletcher gave an account of his expeditions to Nepigon, Lake Superior, in search of the eggs of butterflies. Very little is known, he stated, regarding the early stages of many of our diurnals ; of even so common a species as *Pamphila cernes* they were unknown. In 1885, Prof. Macoun, of the Geological Survey of Canada, collected specimens at Nepigon of a new butterfly, which was named after him by Mr. W. H. Edwards as *Chionobas Macounii*. In 1886 and 1887, Mr. Fletcher went to Nepigon in search of this insect, travelling about 1,500 miles on each occasion, but without success. This year he went again, early in July, accompanied by Mr. S. H. Scudder, of Cambridge, Mass.; on the first day after their arrival they caught five males ; the next day nine females were caught and caged ; from these they obtained about 250 eggs. The egg is larger than and quite different from that of *C. Jutta*, which has been found near Quebec, and bred by Mr. Fyles. Mr. Fletcher also obtained eggs of *Jutta* at Ottawa, and reared the larvæ from them ; the eggs were laid on July 1st, and hatched on the 16th ; those of *Macounii* were laid on the 12th and hatched on the 27th. At Nepigon, he and Mr. Scudder obtained the eggs of 14 species out of 16 that they caged. He then gave a full and most interesting account of the methods of capturing, caging and treating butterflies in order to obtain their eggs, and mentioned that he had received very valuable information and aid from Mr. Scudder in the matter. The simplicity of the apparatus employed deserves mention : " Cages for all small species can be made in a few minutes by cutting off the top and bottom of a tomato can, and then fastening a piece of netting over one end, either by slipping an elastic band over it, or tying it with a piece of string. The female is then placed in this over a growing plant of the species that the larvæ are known to feed upon. These cages had answered well for all the skippers which feed on grass, and the small Argynnides. For such species as lay their eggs on the foliage of shrubs or trees bags had to be tied over living branches, care being taken that the leaves were not crowded up, but that they should stand out freely, so that the female could lay, if such were her habit, upon either the upper or lower side, or on the edge of the leaves. In this way eggs were obtained of *Nisoniades icelus* and *Papilio turnus*. Another cage for insects which lay upon low plants, and which is easily constructed, is made by cutting two flexible twigs and bending them into the shape of two arches which are put one over the other at right angles with the ends pushed into the ground ; over the pent-house thus formed a piece of gauze is placed, and

the edges are kept down either with pegs or earth laid upon them. This kind was useful for larger insects than could be placed in the tomato cans. In these eggs of *C. Macounii*, *Colias eurytheme*, etc., had been secured." *(Entom: Americana* iv., 159*)*. Mr. Fletcher then described the habits of a number of the species collected, referring especially to those already mentioned, and to *Pyrameis huntera*, *Pamphila hobomok*, *Mystic*, and *Cernes*, *Carterocephalus mandan*, *Colias interior*, *Argynnis Vialis*, *Myrina* and *Bellona*, *Nisoniades Persius*, *Fenesica Tarquinins*, etc. He also exhibited living larvæ of *C. Mandan*, *P. hobomok* and *Mystic*, and living imagines of *C. eurytheme*, which had emerged since his arrival in Cleveland. At the close of his address, Mr. Smith expressed the gratifica tion all present felt in listening to so lucid and interesting an account from which everyone would carry away many practical and valuable hints.

The next paper was read by Mr. E. A. Schwarz, of Washington, on "The Geographical Distribution of the Semi-tropical Floridian Coleopterous Fauna." It was followed by a discussion, in which nearly all present took part, as to what should be considered the limits of the North American Fauna, and what species should be included in the fauna of a particular region, reference being especially made to semi-tropical species that are from time to time found in the north.

The Club next proceeded to the election of officers for the ensuing year, and unanimously selected the following: President, James Fletcher, Ottawa, Ont.; Vice-President, L O. Howard, Washington, D. C.; Secretary-Treasurer, Dr. D. S. Kellicott, Buffalo, N. Y.

Saturday, Aug. 18th.—A most enjoyable excursion was made to Put-in-Bay by steamer on Lake Erie. There was a very large attendance of the members of the Association, including the Entomologists. This pleasant feature of the proceedings gave the members a much better opportunity of becoming acquainted with each other than would otherwise have been the case. Arrangements were made for the excursionists to stay on shore for about an hour, and this time was made good use of by the members of the Club. The insect of most interest was secured by Mr. Westcott, who collected in large numbers by beating a small spruce-tree, a remarkable Hemipteron, identified by Prof. Osborn as *Emisa longipes*. Many galls and parasitic fungi were also collected. Among the butterflies noted were *Colias philodice*, *Pieris rapæ*, and what appeared strange to Canadian eyes at this time of the year, *Papilio turnus*; *P. asterias* and

Pyrameis cardui were also observed, and a few specimens of *Utetheisa bella* were captured. The party returned to Cleveland much delighted with their day's outing, and separated to meet next year in Toronto.

ARCTIIDÆ vs. NOCTUIDÆ.

BY JOHN B. SMITH, WASHINGTON, D. C.

Mr. Grote takes occasion in CAN. ENT. vol. xx., p. 168, to criticise my reference of *Cerathosia* to the *Arctiidæ*, contending that it is a *Noctuid.* He complains that I do not give "the reason *why* it belongs to the family." This I hasten to supply, and must beg Mr. Grote's pardon for having presumed him conversant with the characters separating the two families. All authorities give for the *Noctuidæ* a furcate dorsal or internal vein of primaries, while the costal vein of secondaries is from the root, sometimes united with the sub-costal a short distance from base.

In the *Arctiidæ* on the contrary, the dorsal vein of the primaries is simple, while the costal of secondaries is not free, but springs from the sub-costal, a variable distance from base.

In these essential characters, used in all systematic works, my genus is *Arctiid* and *Lithosiid.* The only difference between the *Arctiidæ* and *Lithosiidæ* is in the absence of ocelli in the latter family. Mr. Grote seems never to have seen an unspread specimen of *Cerathosia*, else the striking habital resemblance to *Lithosia* could not not have escaped him.

Mr. Grote has sent to Entom. Amer. a criticism of my genus in a different form, which I have answered more at length.

Some months since, I sent a paper on *Cydosia* and *Cerathosia*, which have considerable resemblance in clypeal structure, to the Proceedings U. S. Natl. Museum, and this when printed will show that my genus is not at all abnormal where I have placed it.

As I can hardly expect to convince Mr. Grote if the specimen itself failed, I have sent an example to Mr. H. B. Moeschler, of Germany, and requested his determination of family, for publicaiton.

It is scarcely worth while to deal with Mr. Grote's objections in detail. Not one or all of them, even were they *all* true, would militate against the *Arctiid* character of *Cerathosia*. I must confess that I consider the

venation and habitus *Lithosiid* rather than *Arctiid*, and would prefer so to place it, even despite the presence of ocelli.

Lest Mr. Grote consider me ignorant, I will say here that I am aware that there are some Noctuids which have the dorsal vein of primaries not distinctly furcate, and some where the costal of secondaries is united with the sub-costal a short distance from base, and thus appears to spring from it.

With this I leave *Cerathosia* to its fate. In my papers I have given *all* the characters, family and otherwise, and shall let each form his own judgment. It needs no more defence from me. In fact, I feel as though I owed an apology for answering objections, not a single one of which is vital.

Mr. Grote's characterizations in his series of papers on the *Bombycidæ* are thoroughly superficial, none of the essential characters being emphasized, while some of them are absolutely incorrect—his definition of the *Lithosiinæ* furnishes an example. He says unqualifiedly, "No accessory cell on primaries." Now, Von Heineman shows that in some genera it is present, while as a matter of fact some species of *Lithosia* have the cell *(cephalica)*, while others have not. It is therefore not even a generic character in this group. To point out all the misleading and inaccurate statements, would necessitate criticising almost every paragraph of Mr. Grote's paper—a task I have neither time nor inclination for. In future I shall not reply to any criticisms Mr. Grote may make, save to admit their correctness where they are well founded.

POSTCRIPT.—Since sending in the above, I have heard from Mr. Moeschler in regard to the specimens sent him. He writes me under date, Sept. 28th. :—"To-day I received the parcel containing the two moths. I have examined them, and there is no doubt you are right. This species belongs to the *Arctiidæ*, as the costal nervule is not derived from the base of the hind wings, but from the discoidal cell; this characteristic separating the *Arctiidæ* and *Lithosiidæ* from the *Noctuidæ*, which have this nervule derived from the base of the wing, only a little connected with the fore edge of the cell. I do not doubt this species is an *Arctiid*, near allied to *Deiopeia* and *Emydia*."

Under date Sept. 30th, Mr. Moeschler again wrote me :—"I received *Entomologica Americana* No. 6 to-day, and it was of great interest to me

to read yours and Mr. Grote's paper on *Cerathosia tricolor* Sm. If Mr. Grote had looked into Lederer's *Noctuinen Europa's* he could read, p. 2, 'sie (die *Noctuinen)* unterscheiden sich von den *Lithosiiden* (inclusive *Nola, Sarrothripa* u. *Nycteola,)* und *Arctiiden* durch die bei diesen aus der mitte oder zwei-drittel des vorderrandes der Mittelzelle entspringenden Rippe 8 der Hinterflügel.'

"Mr. Grote would have spared much pain to prove something not existing, by reasons which are not of any value, if he had remembered the only important characteristic separating the *Lithosiidæ* and *Arctiidæ* from the *Noctuidæ.* I am much surprised that so distinguished a writer as Mr. Grote can omit so important a characteristic; but the systematic position of the genera of the so-called *Zygænidæ,* in his New Check List, is sufficient to prove that Mr. Grote's systematic views are sometimes more than singular.

"Seeing the specimens of *C. tricolor,* my first thought must be: that is a Genus very allied to *Deiopeia (Utetheisa)* and *Emydia,* and I should have been much surprised if an exact examination had given another result."

CORRESPONDENCE.

Dear Sir: In reference to my note on the use of Creolin, I found subsequently discolorations on the leaves which did not appear to be either rust or mildew, but possibly were the result of the Creolin mixture. It is, however, probable that in this disinfectant we have a useful aid against insects as it seems to be avoided by cockroaches and ants, and probably woodwork might be preserved by it in greenhouses. I wished merely to draw attention to Creolin, so that those interested might try it; my own opportunities for doing so being very limited. The rose-bushes, of which I am very fond, seem on the whole no freer from insects in Europe than in America. A. R. Grote.

ARZAMA OBLIQUATA.

Dear Sir: In regard to Mr. Brehme's query, I may mention that all the Arzama larvæ and chrysalids taken here have been found in similar situations, but in no instance has there been the slightest indication that they fed there. The impression made by my observations is:—That the

caterpillars seek out their hibernacula in the fall, remain in that state during winter, and change to chrysalids with the first warm weather in spring. Caterpillars have been found yet imbedded in the winter's frost. In one instance I found one, in early spring, travelling about as if looking for a place to transform; it produced a *Diffusa*. They have never been looked for here in the reeds; as they grow almost entirely in the water, one would require the aid of a boat to make the investigation. When surveying the situation where I have found the Arzamas, I have often wondered how the caterpillars got from the reeds to the land. The shallow part of our marsh where they might easily get ashore is invariably burned over in early spring by pike shooters for their own convenience.

J. Alston Moffat, Hamilton.

BOOK NOTICES.

An Introduction to Entomology, by Professor J. H. Comstock, Cornell University, Ithaca, N.Y. Published by the Author. Part I —pp. 234, 8 vo. (Price $2.00).

The autumn of 1888 is certainly a notable one in the annals of North American Entomology, owing to the publication of so many important works. Last month we drew attention to Dr. Packard's excellent "Entomology for Beginners," and the issue of the first part of Mr. Scudder's grand work on the Butterflies of the Eastern States and Canada. We have now before us the first portion of another admirable work, which is intended to serve as a text-book for students, and to enable them "to acquire a thorough knowledge of the elementary principles of Entomology, and to classify insects by means of analytical keys similar to those used in Botany." The first two chapters of the book treat of the characters and metamorphoses, and the anatomy of insects; the next discusses the Orders of the Hexapoda, to which the author very properly limits insects. In this chapter he gives his reasons for adopting *ten* orders, the number being made up of the seven generally accepted orders and the Thysanura, Pseudoneuroptera and Physopoda; in adhering so closely to the old classification, he states that he has been greatly influenced by a desire to make his book as simple as possible, and "by the belief that an elementary text-book should follow rather than lead in matters of this kind," in which opinion we thoroughly concur. The remainder of

this part of the work treats of the Orders Thysanura, Pseudoneuroptera, Orthoptera, Physopoda, Hemiptera and Neuroptera. In each chapter is given a general account of the Order treated of, an analytical table of the Families, a descriptive account of each family with, in many cases, tabular keys of the genera, and illustrations of the commoner species. Future parts will complete the discussion of the Orders, and furnish chapters on the remedies for noxious insects, directions for collecting and preserving specimens, etc. Judging from the portion before us, we have no hesitation in saying that the complete work will be a most valuable and admirable manual of Entomology; in clearness and simplicity of style, in excellence of illustration and in arrangement of matter, it leaves nothing to be desired. We must not omit to mention that the two hundred wood cuts are for the most part drawn and engraved by the author's wife, and are very good indeed; another excellent feature is the marking of the pronunciation of the accented syllables of technical words, which will no doubt in time help very much to a desirable uniformity in this respect.

C. J. S. B.

INSECT LIFE.—A monthly bulletin, published by the Entomologist and his Assistants in U. S. Department of Agriculture at Washington. Vol. I.—Nos. 1 to 4; July to October, 1888.

This new periodical, "devoted to the economy and life-habits of insects, especially in their relations to agriculture," is a very welcome one indeed. The four parts, of thirty pages each, which have thus far appeared, are filled with matter of great interest to both the scientific and economic Entomologist. With so able and experienced a staff as that at Washington, presided over by Dr. Riley, and with Field Agents at widely distant points, this new magazine cannot fail to be most useful, and to do good work in the spread of valuable and timely information.

C. J. S. B.

INSECTS FEIGNING DEATH.—We have received several more communications on this subject, but we do not think that any useful purpose can be served by their publication. The question is purely one of opinion and definition, and cannot possibly be authoritatively settled in one point of view or another.

Mailed December 8th.

INDEX TO VOLUME XX.

Abbot, John, the Aurelian, 150, 230.
Annual meeting Ent. Club A. A. A. S., 195, 232.
" " Ent. Soc., Ontario, 211.
Ants' nest beetles, 161.
Anthomyia raphani, parasite on, 133.
Arachnida of Labrador, 141.
Arctiidæ vs. Noctuidæ, 236.
Argynnis Atlantis, preparatory stages of, 1.
" Edwardsii, " " 3.
" Hesperis, " " 67.
Arzama obliquata, " " 119, 139, 180, 238.
Ashmead, W. H., articles by, 48, 55, 101, 172, 202, 229.

Acolus borealis, n. sp., 50.
" *Canadensis*, n. sp., 50.
Agrotis agilis, n. sp., 128.
" hospitalis, 129.
Allorhina nitida, 233.
Aneurhynchus mellipes, n. sp., 52.
Anozus siphonophoræ, n. sp., 104.
Anthocharis pima, n. sp., 158.
Anthonomus quadrigibbus, 67.
Aphodius rufipes, 9, 66.
Apion herculanum, 66, 120.
Aprostocetus Americanus, n. sp., 106.
" *Canadensis*, n. sp., 106.
" *granulatus*, n. sp,, 105.
Asecodes albitarsis, n. sp., 103.
Astichus Arizonensis, n. sp., 101.

Bates, J. E., article by, 100.
Bethune, C. J. S., articles by, 195, 211, 217, 232, 239, 240.
Beutenmuller, W., articles by, 15, 16, 57, 134.
Bombycidæ, classification of, 166, 181, 221.
Book notices, 60, 77, 117, 159, 217, 218, 239, 240.
Brehme, H. H., articles by 119, 180.
Butterflies of Ceylon, Moore, 117.
" Eastern U. S. and Canada, Scudder, 218.
" Japan, Pryer, 77.
" Labrador, list of, 148.
" North America, Edwards, 60.
" rearing from eggs, 234.
Butterflies of South Africa, Trimen, 159.

Bembidium assimile, 61.
" pusillus, 61.
" undulatum, 61.
Bolina fasciolaris, 139.
Botis erectalis, 15.
" magistralis, 15.
" quinquelinealis, 179.
Brachycrepis, n. gen., 176.
" *tricarinatus*, n. sp., 176.
Brachynemurus, n. gen., 34.
" abdominalis, 57.
" blandus, 73.
" *Carrizonus*, n. sp., 93.
" longicaudus, 35
" *longipalpis*, n. sp., 95.
" nebulosus, 36.
" *nigrilabris*, n. sp., 72.
" peregrinus, 59.
" *Sackeni*, n. sp., 94.
" versutus, 37.

Calverley's Sphingidæ, 80.
Can insects distinguish between red and yellow? 176.
Canmore, N. W. T., species collected at, 90.
Captures in 1887, Moffat, 178.
" made between Winnipeg and Victoria, 89.
Catocala desperata, preparatory stages of, 28.
" innubens, " " 170.
" palæogama, " " 108.
" relicta, " " 17.
Caulfield, F. B., articles by, 79, 198.
Chalcid, a new species from Canada, 55.
" genus Rileya, 191, 229.
Chalcideous tribe Chiropachides, 172.
Chalcididæ, new North American, 101.
Chionobas jutta, preparatory stages of, 131.
Citheronia, geographical distribution of, 76.
Clark, Howard L., article by, 17.
Clover-root borer, 138.
Cockerell, T. D. A., articles by, 86, 156, 176, 178, 200, 201.
Coleoptera, catalogue of Myrmophilous, 161.
" natural history notes on, 61.

Coleoptera of Labrador, 142.
Colias Cæsonia, preparatory stages of, 21.
" extreme case of seasonal dimorphism in, 201.
" notes on the genus, 24.
Comstock's Introduction to Entomology, 239.
Conopinæ, new South American genus of, 10.
Cotton moth, the, 98.
Creolin, remedy for rose-aphis, 160, 238.

Callimorpha, 39, 79.
Caratomus leucophthalmus, n. sp., 55.
Celiptera bifasciata, 100.
Cerathosia tricolor, 168, 236.
Chiropachys colon, 175.
Chrysomela præcelsis, 66.
Closterocerus, cinctipennis, n. sp., 104.
Cucullia Hartmanni, n. sp., 69.

Danais archippus, observations on, 45, 84, 136, 200, 226.
" " parasite on, 133.
Datana Angusii, preparatory stages of, 135.
" contracta, " " 134.
" Drexelii, " " 57.
" integerrima, " " 134.
" ministra, " " 16.
Death, knowledge of, in insects, 120, 179, 199, 240.
Diadema misippus in Florida, 128.
Dimorphism in butterflies, 86, 201.

Dasyglenes n. gen , 174.
" *osmiæ*, n. sp., 174.
Dendrocharis flavicornis, 64.
Dendroleon obsoletum, 187.
" pantherinum, 185.
Dicerca asperata, 66.
" divaricata, 64.
" dubia, 64.
" lurida, 65.
" obscura, 65.
" prolongata, 64, 120, 178.
" spreta, 65.
Diludia brontes, 56, 112.
" leucophæata, 56.
Dinotus elongatus, n. sp., 175.

Edwards, Henry, articles by, 12, 111.
Edwards, W. H., articles by, 1, 3, 21, 41, 67, 81, 84, 128, 140, 158.
Entomological Club, A. A. A. S., meeting of, 195, 232.
Entomological Society of Ontario meeting, 211.
Entomology for beginners, Packard, 217.
Ectadius Canadensis, n. sp., 51.
Entedon albitarsis, n. sp., 102.
" *Arizonensis*, n. sp., 103.
" *Columbiana*, n. sp., 103.
Erebus odora, 56, 99, 113.
Euderus Columbiana, n. sp., 104.
Eumegaspilus Canadensis, n. sp., 49.
" *Ottawensis*, n. p., 49.

Fletcher J., article by, 218.
French, G. H., articles by, 28, 69, 108, 170.
Fyles, T. W., article by, 131.

Gillette, C. P., article by, 133.
Grote, A. R., articles by, 38, 39, 74, 75, 76, 79, 80, 98, 114, 120, 128, 139, 154, 157, 160, 166, 181, 221, 238.

Graphoderes cinereus, 62.
" fasciatocollis, 62.

Hagen, H. A., articles by, 34, 57, 72, 93, 185, 204.
Hamilton, J., articles by, 6, 61, 120, 161, 179.
Hemileuca, description of a new, 31.
Hessian fly an imported insect, 121.
Holland, W. J., articles by, 77, 89.
Howard, L. O., article by, 191.

Hadena Evelina, n. sp., 71.
" turbulenta, 136.
Harpalus caliginosus, 62.
" compar, 62.
" longicollis, 62.
" Pennsylvanicus, 62.
Hemileuca Californica, n. sp , 31.
Hepialus argenteo-maculatus, 232.
" auratus, 100.
Holcopelte Floridana, n. sp., 102.
" *Microgaster*, n. sp., 102.
" *Missouriensis*, n. sp., 101.
" *Popenoei*, n. sp., 101.
Hylastes trifolii, 138.
Hyperteles hylotomæ, n. sp., 105.

Insects feigning death, 120, 179, 199, 240.
Insect life, 240.

Introduction to Entomology, Comstock, 239.
Ips, notes on, 198.

Ips, fasciatus, 198.
" 4-signatus, 198.

Japanese Butterflies, 77.

Kerosene emulsion for white-grubs, 233.
Kirby, W. F., article by, 230.

Labrador, list of spiders, myriopods and insects of, 141.
Lepidoptera of Ceylon, Moore, 117.
" Labrador, 145.
Lepidopterous larvæ, description of, 15.
Lyman, H. H., article by, 24.

Loxotropa, abrupta, 54.
" *armata*, n. sp., 53.
" *Harringtoni*, n. sp., 53.
" *pezomachoides*, n. sp., 53.
Lycæna piasus, 97.

Marsh, W. D., article by, 45.
Melitæas, two new species of, 81.
Moffat, J. A., articles by, 136, 139, 178, 238.
Morton, Miss E. M., article by, 226.
Moths new to our Fauna, 12, 56, 111.
Myrmeleonidæ, stray notes on, 34, 57, 72, 93, 185, 204.

Macrosila Hasdrubal, 13.
Megaspilidea minuta, n. sp , 49.
Megaspilus Harringtoni, n. sp., 48.
Melanophila longipes, 92.
Melitæa Brucei, n. sp., 81.
" *Taylori*, n. sp., 82.
" rubicunda, 83.
Meristhus cristatus, 64.
Metaclisis erythropus, n. sp., 51.
Monelata hirticollis, n. sp., 54.
Myrmeleon formicalynx, 206.
" formicarius, 210.
" immaculatus, 188.
" mobilis, 204.
" rusticus, 210.

Nanaimo, B. C., Coleoptera, collected at, 91.
Nathalis iole, orange spot in, 156.
Nepigon, butterflies taken at, 212, 234.
Noctuidæ, late papers on, 38.
" some new, 69, 128.
Notes, 40.

Neoclytus capræa, 66.

Obituary, 140.
Orange spot in Nathalis iole, 156.
Ornamentation, origin of, in Lepidoptera, 114.
Orthesia, new species from California, 202.

Omphale bicinctus, 103.
Orthesia Edwardsii, n. sp., 203.
Orthosia hamifera, n. sp., 130.
Oxyporus 5-maculatus, 64.

Packard, A. S., article by, 141.
" Entomology for beginners, 217.
Paphia troglodyta, preparatory stages of, 41.
Phycitidæ, the diagnoses of N. American, 74.
Proctotrupidæ, new genera and species of, 48.
Protection and defence in insects, characters of, 154.
Pryer, H., death of, 140.
Paphia glycerium, 43.
Papilio turnus, 228.
Paramesius clavipes, n. sp., 53.
Pentacantha Canadensis, n. sp., 51.
Philampelus typhon, 14, 56, 99, 112.
Philhydrus fimbriatus, 63.
Phurys vinculum, 100.
Pleurotropis leucopus, n. sp., 102.
Prosacantha brachyptera, n. sp., 50.
Pseudosphinx obscurus, 13.
" tetrio, 12, 56, 112.
Pteromalus archippi, 133.

Rileya, the chalcid genus, 191, 229.
Riley, C. V., article by, 121.
Rose-aphis, remedy for, 160, 238.
Ross's second voyage, German edition of, 157.
Rileya splendens, 193.

Scudder, S. H., articles by, 117, 150, 159, 232.
Smith, J. B., articles by, 56, 236.

Sactogaster Howardii, n. sp., 52.
Saperda concolor, 8, 66.
" Fayi, 6.
Selenia kentaria, 75.
Stenosphenus notatus, 66.
Syntomeida epilaris, 14, 112.

Trimen's Butterflies of South Africa, 159.
Types, notes upon authors, 75, 197.

Thyreus Abbotii, 154.
Trichogramma acuminatum, n. sp., 107.
" *ceresarum*, n. sp., 107.
" nigrum, n. sp., 107.
Trogosita virescens, 92.
Tropidomyia, n. gen., 11.
" *bimaculata*, n. sp., 11.

Van Duzee, E. P., article by, 100.

Webster, F. M., article by, 199.
White, J., article by, 138.
Williston, S. W., article by, 10.
Wind-visiting moths, 98.
Wittfeld, Miss A. M., death of, 140.
Wright, W. G., articles by, 31, 97.

Xylomiges Fletcheri, n. sp., 130.

Yokohama naturalist, death of the, 140.

Zygota Americana, n. sp., 54.

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HEMIPTERA FROM MUSKOKA LAKE DISTRICT.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

This list is presented as a slight contribution to our knowledge of the geographical distribution of the North American Hemiptera. As our literature of this order is by no means overburdened with faunal lists, I trust that the present will find sufficient excuse for its appearance in the matter it contains. I have made every effort to have the list as accurate and complete as possible, under the circumstances. The material was accumulated during a brief collecting tour in the Muskoka Lake District of Canada, in the interval from July 25th to August 3rd, 1888. The particular localities being in the vicinity of Bracebridge, along the Muskoka River to the Lake, and some of the adjoining islands, and along the road from Bracebridge to South Falls.

For the information of such as are not conversant with the physical features of this beautiful Lake District, I will add that it lies in the metomorphic belt reaching eastward from the Georgian Bay. The surface is somewhat rugged, with bold, rocky bluffs from one hundred to two hundred feet in height, skirting the river and lowlands; the latter presenting a good depth of soil, which is elsewhere very thin, in many places quite insufficient to cover the rocks. Coniferæ, poplars, birches, and a few oaks form the bulk of the timber on the rocky highlands, with the addition of maple, hickory, beech, basswood, etc., on the deeper soils. The undergrowth is largely hazelnut, with blueberry, raspberry, viburnum, spiræa, and other bushes interspersed. Away from the cultivated areas very little grass is to be found; but carex, cypreus and glyceria take its place to a large extent. The bane of this land is the ever-recurring "bush-fire," and to an entomologist a "burned district" is a wilderness indeed.

The Hemiptera taken were largely such as might have been expected from this locality, but were more numerous in individuals than I had

anticipated; the Homoptera especially, seemed proportionately more numerous than farther south, and included many rarities.

I am indebted for a number of the species here enumerated, to the kindness of Mr. A. H. Kilman, who was one of our party, and who passed over to me any luckless Hemipter that perchance found lodgment in his indefatigable umbrella. To Mr. P. R. Uhler, I am under renewed obligations for the determination of some of the more difficult forms, especially in the Capsidæ.

HETEROPTERA.

Scutelleridæ.

Homœmus œnifrons Say. Occasional on sedges and weeds on the lowlands.
Eurygaster alternatus Say. Abundant with the last.

Corimelœnidæ.

Corimelœna atra Am. and Serv. One nymph taken.
Corimelœna pulicaria Germ. A single example.

Pentatomidæ.

Podisus spinosus Dall. Taken here as elsewhere on trees and bushes, but more rarely than the next.
Podisus modestus Dall.
Neottiglossa undata Say. Common.
Cosmopepla carnifex Fab.
Mormidea lugens Fab. One example.
Euchistus fissilis Uhl.
Euchistus tristigmus Say. Occasional.
Banasa calva Say. Abundant on the arbor-vitæ.

Coreidæ.

Alydus eurinus Say. Frequent on flowers of the Canada thistle in old fields.
Protenor Belfragei. Hagl. = *Tetrarhinus Quebecensis* Prov. One nymph swept from weeds.

Berytidæ.

Neides muticus Say. Common.
Corizus punctiventris Dall. Larger and darker coloured than examples from Buffalo.
Corizus nigristernum Sign. Less abundant than the preceeding. At Buffalo it is the common form.

Lygæidæ.

Nysius grœnlandicus Zett. Scarce.

Cymus luridus Stâl. Three examples, swept from a low swampy spot by the roadside, near South Falls.

Cymus angustatus Stâl. Not common.

Cymus claviculus Hahn. Abundant everywhere on the lowlands.

Blissus leucopterus, Say. One brachypterus example, swept from the borders of an oat field on Muskoka river, near the lake.

Geocoris borealis Dall. Taken with the preceeding. This appears to be but a dark variety of *G. bullatus* Say.

Ligyrocoris sylvestris Linn. Very abundant in the cultivated districts.

Peliopelta abbreviata Uhl. One small, short-winged example captured.

Capsidæ.

Brachytropis calcarata Fall.

Trigonotylus ruficornis Fall.

Miris affinis Reut.

Collaria Meilleurii Prov. These four species were not uncommon where cultivation had prepared the way for them. The latter was just coming to perfection.

Hadromena pulverulenta Uhl. (MS.) Two examples.

Diommatus congrex. Uhl. Rare.

Phytocoris eximus. Reut. Occasional.

Phytocoris pallidicornis Reut. Abundant, and of large size.

Phytocoris colon. Say. One example.

Neurocolpus nubilus Say. Common, and as a rule, deeply coloured.

Calocoris rapidus Say. A single specimen.

Melinna modesta Uhl. Beaten from pine trees.

Lygus pabulinus Linn.

Lygus pratensis Linn.

Lygus flavonotatus Prov. A few taken.

Lygus invitus Say. Common.

Lygus intersectus Uhl. (MS.) Abundant.

Coccobaphes sanguinarius Uhl. Not uncommon on maple and beech trees, especially near South Falls.

Pœciloscytus unifasciatus Fab. Numbers taken on the cultivated uplands south of Bracebridge, and elsewhere.

Pœcilocapsus lineatus Fab. Rare.

Largidea opaca Uhl. (MS.) Smaller and slighter than New York examples.

Camptobrochis grandis Uhl. Common. Apparently of nocturnal habits, as I took several flying around the candle at our camp; some of these individuals were extremely dark, even approaching an almost uniform piceous black; others were as pale as those taken near Buffalo.

Neoborus Petitii Uhl. (MS.) Several pale examples.

Fulvius anthocoroides Uhl. One example.

Monalocoris filicis Linn. Common everywhere on ferns.

Hyaliodes vitripennis Say. This neat little species was taken frequently on pines, and occasionally on other trees and bushes.

Pilophorus amœmus Uhl. Common on pine trees.

Globiceps flavomaculatus Fab. One example taken. This species was erroneously cited as occurring at Buffalo, in my list of Capsidæ from that locality (CAN. ENT., xix., p. 72, 1887). The insect there referred to was the next, which superficially resembles the *flavomaculatus*.

Mimoceps gracilis Uhl. (MS.) A few swept from grass and weeds near a rivulet among the hills.

Mecomma gilvipes Uhl. (MS.) Three examples taken with the preceeding.

Macrolophus seperatus Uhl. Three examples.

Stiphrosoma stygica Say. Scattering.

Labops hesperia Uhl. A few brachypterus examples swept from an oat field on the flats near the mouth of the river.

Idolocoris agilis Uhl. Common on the lowlands.

Orthotylus alternatus Uhl. Common on bushes, especially the hazelnut.

Macrotylus guttatus Uhl. (MS.) One example of this elegant little Capsid was swept from briars growing on a rocky hillside near the river.

Rhinocapsus Vanduzeii Uhl. (MS.) Not uncommon among rank weeds in damp situations.

Psallus variabilis Fall. A single example.

Psallus antennatus Uhl. (MS.) Several taken.

Plagiognathus obscurus Uhl.

Agalliastes associatus Uhl. One example of the typical form occurred to me while sweeping near South Falls.

Anthocoridæ.

Dolichomerus elongatus Reut.

Dilasia fuscula Reut Two examples taken from a log of hard maple ; they occurred under loose bark where there was a slight fungoid growth.

Triphelps insidiosus Say. Common.

Anthocoris musculus Say.

Tingitidæ.

Galeatus Peckhami Ashm. (*Sphærocysta Peckhami*, Ent. Am , vol. iii., p. 156). Swept from low weeds—probably a dwarf vaccinium or a species of aralia, which were growing together—among pines on a rocky island. I am indebted to Mr. Uhler for this generic reference. The three examples taken agree in every respect with Mr. Ashmead's description, and I think there can be no doubt of their identity.

Corythuca arquata Say. (?). The small form, which is probably a distinct species, occurred abundantly on birches everywhere. I have taken it from osier bushes at Machias, N. Y., also at Pine Swamp, near New Haven, Ct. If distinct it would seem to be the northern analogue of *C. arquata.*

Corythuca marmorata Uhl. One example.

Aradidæ.

Aradus quadrilineatus Say.

Aradus rectus Say.

Reduvioidea.

Coriscus subcoleoptratus Kirby.

Coriscus inscriptus Kirby. Common.

Coriscus ferus Linn.

Sinea diadema Fab. Scarce.

Opsicœtus personatus Linn. Bracebridge. One example.

Hydrobatidæ.

Hygrotrechus remigis Say.

Limnotrechus marginatus Say. Abundant in favorable localities.

Limnoporus rufoscutellatus Latr. One example.

Metrobates hesperius Uhl. Muskoka Lake. On pleasant afternoons, when the surface of the water was smooth, these insects would congregate in immense numbers, closely covering an area of several yards in extent. A breeze, sufficient to slightly ruffle the surface, would quickly disperse them, but whither I failed to discover, as I was unable to detect any along the shore. The majority of the specimens taken were immature ; they differ from the adult in having five, pale yellow spots in addition to the pronotal—one on the centre of the metanotum, one above each anterior, and another before each posterior coxa.

Salididæ.

Salda interstitialis Say. Common along the shores of the river and lake.

HOMOPTERA.

Cicadidæ.

Cicada canicularis Harris. The familiar shrilling of this species was frequently heard in the heat of the day among the tree tops.

Membracidæ.

Enchenopa binotata Say. Apparently rare.

Ceresa bubalus Fab. Common, but mostly of the small dark coloured variety, with blunt thoracic horns.

Ceresa diceros Say. Occasional.

Telamona coryli Fitch. Abundant on the hazelnut. The females are frequently of an almost uniform brownish-ferrugineous, with but slight indications of the pale bands, thus approaching closely the next, from which it probably is not distinct.

Telamona tristis Fitch. Common with the preceding.

Telamona fagi Fitch. One example.

Telamona reclivata Fitch. Three examples. Variable both in colour and form of the crest ; this being sometimes sharply angled behind, or again obtusely rounded ; and the posterior edge may be either sloping or almost vertical. The present examples are very dark in colour, the pale areas being much obscured by fuscous punctures.

Carynota marmorata Say. Numbers taken from a small poplar bush (probably *P. grandidentata*), on the uplands south of Bracebridge.

My examples correspond with Say's short description, except that the tip of the thorax extends to, and in some cases beyond, the apical areole. According to the characters given by Say, it must belong here and not to *Cyrtosia*, where it is placed by Dr. Fitch.

Smilia camelus Fab. Two examples beaten from oaks.

Cyrtosia vau Say. Not infrequent on trees.

Fulgoridæ.

Sub-family *Cixiidæ*.

Cixius stigmatus Say. Not common.

Cixius pini Fitch. Occasional on various low bushes; rarely on pine. Near Buffalo I have taken it only on vaccinium.

Oliarus quinquelineatus Say. More abundant than the preceding forms.

Sub-family *Delphacidæ*.

This family was well represented, but I have not studied the material taken.

Sub-family *Achelidæ*.

Two undetermined species of this family occurred in single examples.

Sub-family *Derbidæ*.

Otiocerus Coquerbertii Kirby. Not uncommon on maple and beech trees.

Otiocerus Degeerii Kirby. Beaten from oak and beech trees. Another small and probably undescribed form occurred, which I had the misfortune to lose while in the field.

Anotia sp. One example taken among bushes on the bank of the river at Bracebridge. It is, perhaps, a variety of *Bonneti* Kirby.

Lamenia vulgaris Fitch. Abundant and of large size.

Sub-family *Issidæ*.

Bruchomorpha oculata Newm. Abundant in damp grassy localities, especially on the lowlands. One example has the elytra fully developed. They are long and narrow, somewhat surpassing the

abdomen in length; sides parallel, not widened at tip; of a deep smoky-brown colour, almost opaque. Nerves very strong and simple, the radial and two ulnar nerves run straight and undivided to the transverse nerve, which crosses the elytra a little beyond the tip of the clavus, forming three large cells on the base of the corium; the second ulnar is forked at the transverse nerve, the first ulnar is twice forked beyond the transverse, and between this and the radial is a short nerve from the transverse to the costa; these forming seven apical cells, of which the medial is small and triangular, and the next inner the largest and rectangular; the claval nerves unite beyond the middle, the resulting nerve joining the claval suture just before its apex.

Peltonotus histrionicus Stal. One example. Occurs also at Buffalo.

Cercopidæ.

Lepyronia quadrangularis Say. Rare.

Aphrophora quadrinotata Say. Very abundant on the lowlands, but mostly immature; the imagines were just beginning to appear.

Aphrophora parallella Say. Common on pines.

Aphrophora saratogensis Fitch. Rather more abundant than the preceeding, with which it occurred and which it greatly resembles; it is, however, readily distinguished by the more obtuse head, clearer markings, and concolorous punctures.

Clastoptera obtusa Say. Very common on the blueberry.

Clastoptera proteus Fitch. With the last.

Bythoscopidæ.

Idiocerus pallidus Fitch. Abundant on willows, birches, etc.

Idiocerus suturalis Fitch. On low poplar bushes near the river; even more abundant than the preceeding.

Idiocerus lachrymalis Fitch. Numbers of this, our largest species, occurred on birch and other trees.

Idiocerus alternatus Fitch. Scarce. It is with slight misgivings that I place this insect here, although I believe future study will justify the reference.

Agallia novellus Say. As abundant at Muskoka as in New York; on grass and weeds.

Agallia flaccida Uhl. But few of this common species were seen at Muskoka.

Agallia siccifolia Uhl. Not uncommon in dry pastures.

Pediopsis viridis Fitch. Apparently rare.

Pediopsis variabilis Fitch. Examples occurred of varieties *A.* and *C.* of Fitch, and a single specimen of a uniform ferrugineous, with pale yellow elytra crossed from the shoulder to the apex by a broad ferrugineous band.

Pediopsis minor Fitch. Two examples.

Pediopsis fenestratus Fitch. A common species on birch trees.

Tettigonidæ.

Oncometopia costalis Fab. Very abundant among coarse weeds and grass, particularly near South Falls, where the pretty striped nymphs occurred with the newly developed imagines.

Diedrocephala coccinea Forst. Not uncommon on blackberry bushes.

Diedrocephala mollipes Say. Common.

Diedrocephala novæboracensis Fitch.

Helochara communis Fitch. Common.

Euacanthus orbitalis Fitch. A few examples taken.

Gypona 8-lineata Say. The form named *flavilineata* by Dr. Fitch occurred abundantly on various trees and bushes. I place this variety with *8-lineata* Say, as it seems impossible, on a superficial examination, to find any constant characters for separating the two forms, although they have every appearance of being distinct species. Some of the examples taken exhibit no indications of the yellow lines on the head, pronotum and scutellum, while all are extremely variable in the elytral venation. A careful study of our northern species of *Gypona* is needed.

Jassidæ.

Acocephalus vitellinus Fitch. One example.

Grypotes unicolor Fitch. Not uncommon.

Cicadula (Macrosteles) quadrilineata Forbes. A few examples of this common species occurred on cultivated lands. Near Buffalo it is

quite variable, some individuals corresponding very closely with Mr. Uhler's description of *Jassus divisus*, with which this may prove identical.

Thamnotettix eburata n. sp. Form and aspect of *clitellaria* Say, to which it is closely related. Above brown with a large white discal spot, beneath white; venter marked with black and yellow ♂, or whitish ♀. Vertex pale yellow, whitish on the base, slighly suffused with ferrugineous on each side near the eye; a central impressed line extending about half way to the apex. Face whitish, slightly tinged with yellow. Antennæ white, setæ brown. Pronotum and scutellum dark ferrugineous or fuscous, the latter paler with a transverse impressed black line before the apex, behind which the edges are narrowly yellow, and slightly calloused. Hemielytra;—Clavus fuscous, the common disc with a large, obtusely cordate, ivory white spot which is slightly suffused with yellow; behind this spot is a dark area. Costal half of the corium milky white, almost opalescent, tip broadly fuscous; discal half brownish ferrugineous, paler posteriorly, and shading to fuscous along its junction with the white costal area. Beneath and legs white, immaculate; small spines at tip of the tibiæ and tarsal joints slightly embrowned; claws black. Venter black, posterior edge and disc of the segments yellow; the latter with a central black line, represented by dots on the three basal segments; convexivum yellow; tergum black. Wings milky hyaline, veins faintly brownish. The female differs from the male in being somewhat paler, in having the discal spot of the elytra more yellowish, and the abdomen pale yellow or whitish. In the venation of the elytra and other structural features this species agrees very closely with *clitellaria*. The ♂ has the last ventral segment slightly concave posteriorly; valves obtusely triangular, black; plates white, sparsely covered with long concolorous hairs. The ♀ has the last ventral segment black, with the lateral margins pale; as in *clitellaria* it is deeply incised each side of the middle, leaving a central tongue, which is minutely emarginate at tip; pygofers pale, suffused with brown toward the central groove, and fringed with long pale hairs. Length, ♂ 5 mm.; ♀ 5½–6 mm. A male was swept from grass near a rivulet at Bracebridge; also taken in the vicinity of South Falls.

Athasanus striola Fall. Occurred abundantly near South Falls, on a low meadow overgrown with swamp grasses ; here they were of large size, measuring in some cases 6 mm. to tip of the elytra ; elsewhere, scattering and of normal size.

Allygus irroratus Say. Taken in moderate numbers. Both the normal form and the large variety, with the vertex produced and flattened, occurred together here as elsewhere ; the variety predominating in moist situations.

Jassus immistus Say. Common among low bushes and briars. This pretty insect seems to be congeneric with a form occuring near Buffalo, of which I have seen specimens in the National Museum labelled *Scophoideus jucundus* Uhl. A third and undescribed species occurred to me at Muskoka.

Platymetopius acutus Say. Moderately abundant.

Deltocephalus debilis Uhl. Rare. Occurs also at Buffalo.

Deltocephalus configuratus Uhl. Abundant here as elsewhere.

Deltocephalus sayi. Fitch. Scarce.

Deltocephalus inimicus Say. Very common on cultivated lands.

Typhlocybidæ.

Several species of these minute insects occurred ; but as the North American species have been but little studied they are omitted from the present list.

Psyllidæ.

Psylla carpini Fitch. Abundant on the blue beech.

Aphididæ.

Want of time precluded any attempt at collecting the *Aphididæ* and *Coccidæ.*

In addition to the 141 species here enumerated a number of doubtful forms were taken, belonging mostly to the Homoptera ; giving a total of something over 150 species as the fruits of ten days collecting.

FURTHER NOTES ON CHIONOBAS JUTTA.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

Our President has asked me what methods I adopted for the raising of *C. jutta* from the egg. I will endeavour to describe them.

As it is well known that larvæ of the genus *Chionobas* feed on grasses, my first care was to determine what grasses were to be found in the haunts of *Jutta*, and to notice the circumstances under which they grew. I found several, all rooted in the sphagnum of the swamp. I took home roots of every kind, and potted them in sphagnum, being careful to close the hole in the bottom of each flower pot with a cork, and to soak the plants thoroughly with rain water. I soon had a number of thriving plants. I placed the pots containing these—so near together that some of the blades of every plant intermingled with blades of the rest—in a box of convenient size; and I filled up the interstices, to the level of the rims of the pots, with sphagnum. I then made a slight, arched lattice over the top of the box, and stretched a piece of green netting over it. My cage was then ready. When *Jutta* was pretty well worn, *i. e.*, about the 12th of June, I captured two or three females, and placed them in my cage. On the 17th of that month I found a number of eggs, not laid on the blades of grass, but scattered over the netting. When the larvæ appeared, I placed, by means of a camel's hair pencil, a few of them on each plant; but I soon found that they congregated on the sedge. This then, I concluded, was their favourite food-plant. I kept the cage on the seat of an open window with a north-western aspect; and, whenever it rained I removed the covering of the box, and let the insects have the benefit of the shower. In dry times I occasionally sprinkled them at sunset with soft water.

In August I noticed that my insects were seriously decreasing in number. As their habits were unknown I thought it possible that the vanished specimens had buried themselves in the sphagnum, and would in due time again appear; but a wounded larva, that had evidently been nipped by a foe, at length aroused my suspicions. I procured fresh plants of sedge, placed upon them all the larvæ I could find, and then spread a large sheet of paper, and upon it pulled all the old bedding to pieces. The result was that I found, not the lost larvæ, but several very well grown specimens of *Lithobius Americanus*. I consider this creature therefore a

foe to be guarded against. On the approach of winter the care of *Jutta* became perplexing—the more so as I was about to leave for England. I at length resolved to place the case, near a window, in a outer passage leading to a dairy. There it would be, I thought, sufficiently removed from the warmth of the house, and would escape the crushing weight of the winter's snow. I left the larvæ supplied abundantly with sedge growing in well soaked sphagnum. On my return in February only six of the larvæ remained. They were torpid, but fresh and plump. A mild day came, and one of the larvæ revived; but the mild day was followed by a bitter night, and the adventurous larva perished. When the others began to revive I moved the cage into a room where the temperature could be better regulated. Of the remaining larvæ one afterwards died and four went into chrysalis. The chrysalids were naked, unattached, and lay on the surface, or just below the surface of the sphagnum. I sent one of them to Mr. W. H. Edwards, and one I preserved as a specimen. The other two produced butterflies. The first of these appeared on the 31st of May, and was crippled. I thought that perhaps I had kept the chrysalis too dry, and I sprinkled the one remaining with fresh water. Next day a beautiful and fully developed female *Jutta* presented itself, crowning my efforts with success. It was as large as the largest specimens I had taken in a state of nature. The only difference I could perceive—and it was hardly perceptible—was that the insect raised in captivity was of a somewhat paler brown than the others.

ONE WORD MORE ABOUT RILEYA.

BY L. O. HOWARD, WASHINGTON, D. C.

(See Mr. Ashmead's communication in December CAN. ENT.)

Without entering further into the discussion of priority, beyond stating that Mr. Ashmead is wrong in his points (1), that my original communication was read after the publication of his synoptical table, (it was read two days before the receipt of the number of *Entomologica Americana*, in which the table was published), and (2), that his full description was published before mine; (mine was published nine days before the receipt of the Kansas bulletin). I wish to say just a word in reply to his supposi-

tion as to the identity of *Lonchocerus* Dahlbom and *Rileya* Howard. His statement that I had not consulted the European literature is, of course, uncalled for and absurd. I had not only familiarized myself with the European descriptions, but had sent specimens to Dr. Mayr, who so ably monographed the European Encyrtinæ some years ago, and whose opinion corroborated my own as to the novelty of this form. Mr. Ashmead's comparison of Thomson's description with my own must have been most hurried, as they differ so widely that I would advise him to retract his expressed opinion for the sake of his entomological reputation.

I tabulate here the differences which can be noted from comparison of the two descriptions and my figure of *Rileya*. The quoted portions in the *Rileya* column are from the description, and the unquoted portions can be verified from the figure. *Lonchocerus*, by the way, is nothing but a synomym of *Mira,* if Thomson is right in supposing that Dahlbom founded the genus for Dalman's *Encyrtus platycerus*. Dahlbom's genera in the Encyrtinæ were described, however, without any indication of types.

RILEYA HOWARD.	LONCHOCERUS DAHLBOM.
"Face * * * gently rounded, and has a strong, glistening, transverse, clean-cut ridge just above the insertion of the antennæ."	"Caput subtriangulare, vertice sat lato, lateribus tereti, medio subacuto."
Antennal club not jointed.	"Clava 3-articulata."
Mesoscutum transverse, "highly polished."	"Mesonoto [mesoscutum] haud transverso, dense albo-sericeo."
"The mesoscutellum has a strong tuft of erect, black hairs" at tip only.	"Scutellum dense holocericeo-pubescens."
Wings not shortened; when closed reaching considerably beyond tip of abdomen.	"Alæ abbreviatæ, Thorace vix superantes."
"The stigmal vein is given off immediately at the juncture of the submarginal with the costa." Consequently there is *no* marginal vein.	"Stigmate [marginal vein] lineari, distincto."
Abdomen flattened ovate, cutely pointed behind, "highly polished."	"Abdomen subglobosum, dense albo-pubescens."

In conclusion, I wish to apologize for the slip (or misprint) in the use of "1887" for "1888." The change does not alter the relative order of the events, and the date of reading the paper is unimportant.

POPULAR AND ECONOMICAL ENTOMOLOGY.

WINTER COLLECTING.

BY JAMES FLETCHER, OTTAWA.

At the last annual meeting of the Entomological Society of Ontario, it was decided that every month there should be at least one short article upon the above subject. The Council consider it wiser not to increase the size of the CANADIAN ENTOMOLOGIST at the present time, but to take two pages from the space we now devote to Scientific Entomology. It is true the space at our disposal is all too small to accommodate the valuable articles sent in by our friends, but the demands are so frequent for articles of the nature mentioned, that it has been decided to try the experiment of having them regularly, and it is thus hoped to largely extend the influence of the Society by inducing more lovers of nature to take up Entomology as a study, and by providing agriculturists and horticulturists with short and simple accounts of their insect enemies and the latest discovered remedies. It has been suggested that the winter is an inappropriate time of the year to begin such a series of articles ; but upon slight consideration this will be found to be not at all the case. In the continuous chain of nature, great interest will be found at every link and thing unexpected, strange and of marvellous beauty will appear at every point. Even in Canada, snow and ice-bound for so many months in the year, there is much collecting which can be done in the winter. A favorite occupation of the writer is to go off collecting with a congenial companion upon snow-shoes. The charm of this pleasant exercise in which, supported by the light snow-shoes, one can visit places inaccessible during the summer, is in no way diminished by being able to take home with you specimens which will afford ample occupation for many evenings. Starting off in a straight line many objects of interest are met with as we go along, across field and fences, through woods and swamps and over rivers, hills or even mountains, all levelled and smoothed down to an even surface by their thick covering of ice and snow. In passing through the woods and swamps cocoons are eagerly looked for on the slender boughs of trees and shrubs. It is seldom that we are not rewarded with cocoons of the large Emperor moths. In crevices of bark and beneath moss, many hibernating insects are discovered of several orders. Larvæ of moths and chrysalids of butterflies, beetles and hemiptera. One of our annual trips is to a certain

tree for the pretty little homopteron, which forms galls on the leaf of the hackberry (*Psylla Celtidis-mamma*, Riley), and which passes the winter in a torpid state beneath the scales of the bark of the hackberry, the color of which it closely resembles. In passing through the swamps, tufts of moss are pulled from any exposed hummocks to be picked to pieces at home when they have thawed out. Here will be found many treasures which we have not found in any other way. Every cluster of leaves adhering to a deciduous tree or swelling upon a stem has to be examined for the cause, and if it prove to be the work of insects, must be put into the bag for examination. The only apparatus necessary for these expeditions is a bag slung over the shoulders and a stick with a hook on one end and a spike on the other; the bag acts as a large pocket, and saves the inconvenience of unbottoning your coat, when, perhaps, the thermometer is below zero. The hook on the stick is useful for pulling down boughs or pulling yourself out of a hole; the spike for prying off pieces of bark or digging into old stumps.

Objects of great interest, some of which can be better collected, and from which the insects can be more successfully bred when collected in the winter time, are the various kinds of plant galls. These require little trouble, all that is necessary is to put them away in glass jars and keep them closed. After a time the occupants begin to emerge, and to the surprise of the uninitiated, although each kind is made by only one kind of insect, from the galls will be produced perhaps half a dozen distinct species. These are most of them parasites upon the gall-maker, or what are known as inquilines or guest flies. The gall-maker produces the gall upon the plants. In this gall some of these guest flies deposit their eggs, and the young grubs feed upon the substance of the gall, or others again live as parasites, either upon the grubs of the gall-makers or their guests. Watching these as they emerge and making notes upon them, will be found most entertaining at a time of the year when there is little active life out of doors. A further zest is added to this department of study from the fact that so little has been done in this line, that many of the flies so bred will be new to science.

Other places which may be visited in the winter, are groves of evergreens where much will be found to repay the collector. Amongst the leaves of the pines are cases of larvæ, and in the leaves themselves are the burrows of the caterpillar of a tiny moth. Beneath the bark are numerous scolytid bark-borers, and from the solid wood beneath may be ex-

tracted the large grubs of the timber borers ; to obtain these last, however, an axe will be found necessary. In the garden the horticulturist will find plenty of work with which to occupy himself profitably. The egg masses of the tent caterpillars should now be collected and destroyed as well as those of the Tussock moths. Clusters of dead leaves should be removed from apple trees and their stems cleared of the scales of the oyster-shell bark louse and other small insects which winter in rough places on the bark or amongst the buds.

In addition to the above work out of doors, much is to be done during the winter to prepare for the work of the coming season. Apparatus and storing boxes for specimens should be prepared well beforehand, or, perhaps, when the time comes to use them, opportunities will be lost. Some simple elementary book should be procurred and read at leisure. In our library at London, we have for the use of our members, many books of this nature which can be borrowed by applying to the librarian. We should recommend to beginners Kirby & Spence's Entomology, Packard's Entomology for Beginners, and Comstock's Introduction to Entomology.

PHILIP HENRY GOSSE.

On Thursday the 23d of August, Philip Henry Gosse, departed this life at St. Marychurch, near Torquay, Devonshire. He was born at Worcester, on the 6th of April, 1810, and early displayed a taste for natural history. In 1827, he was engaged as clerk in the extensive mercantile house of Messrs. Slade, Elson, Harrison & Co., of Carbonear, Newfoundland. In June, 1835, he removed with his friend, Mr. G. E. Jacques, (now living at Cowansville, P. Q.,) to Lower Canada. He bought a farm one mile east from Waterville, on the River Coaticook. During the summer he cultivated his land, and in the winter he taught the Compton village school. At this time he collected the materials for his first work, the *Canadian Naturalist.* The rough life of a Canadian farmer, in a comparatively new settlement, was ill-suited to this young man of refined tastes ; and the "noisy politics" and "martial alarms" of the times must have jarred on his ear, attuned as it was to the music of nature. Then, too, the people of the neighborhood were not of a class to appreciate his studies. They were wont to speak of him as "that crazy Englishman

who goes about picking up bugs." It was well for him that as a naturalist, to use his own words, he could find "gratification in any scene and at any season," and that in Mr. Jacques, in whose house he boarded, he had a congenial friend. In Chapter viii. of his work, he draws a gloomy picture of an Eastern Township farmer's life; but in the preface (which breathes the modesty and piety which characterized him through life), he says:— "During a residence of some years in the Lower Province, the author has felt it to be no common privilege to be able to solace himself by these simple but enchanting studies * * * and even now the recollection of those pleasant scenes sheds forth a lustre which gilds the edge of many a dark cloud."

In March, 1838, Mr. Gosse left Compton, and settled in Alabama for about six months. His observations at this period afforded the subject matter of his *Letters from Alabama, chiefly relating to Natural History*. He returned to England in the spring of 1839, and published the *Canadian Naturalist* during the summer. On the 10th of August, 1844, he sailed for Jamaica, to study the natural history of that island. After a residence there of two years, he went back to England, and published the result of his investigations, under the title of *The Birds of Jamaica*, *A Naturalist's Sojourn in Jamaica*, and *An Atlas of Illustrations*.

From January, 1852, to the time of his death, Mr. Gosse's residence was at St. Marychurch, where he had a delightful residence which he named "Sandhurst." Attached to this were extensive conservatories, including a vinery, fernery, orchid houses, etc.

For some years, he was engaged in preparing works for the S. P. C. K. After that he devoted himself to the microscopic study of the British Rotifera. In 1856, he was elected a Fellow of the Royal Society. He was an indefatigable worker, usually in his study by four o'clock in the morning in the summer, and by six o'clock in the winter, and producing on the average two works in the year. His books must number about forty; and among the scientific papers of the Royal Society upwards of fifty are from the pen of Mr. Gosse.

Among his works are:—*Tenby, A Sea-side Holiday; The Aquarium; Actinologia Britannica; A History of the British Sea Anemones and Corals; The Wonders of the Great Deep; The Romance of Natural History; Life in its Lower, Intermediate, and Higher Forms; Land and Sea*, and *A Year at the Shore*.

Always of a religious turn of mind, he delighted in sacred history and Biblical studies; and a number of words of a sacred and historical character proceeded from his pen. The last of these, published in 1884, was entitled, *The Mysteries of God, a Series of Expositions of Holy Scripture.*

One cannot often point to a life more pleasantly and usefully spent than that of Philip Henry Gosse.

THOMAS W. FYLES.

CORRESPONDENCE.

DANAIS ARCHIPPUS.

Dear Sir: I send you my season's observations on the movements of *D. archippus* in this locality. The spring of '88 was an unusually backward one here, cool, dry weather prevailing, which will, of course, affect all the dates more or less. I commenced by watching for the appearence of milk-weed *Asclepias cornutus* in two places where it grows in abundance; one, a flat to the west of the city, protected on the east and north by a high bank; the other to the east along the foot of the Niagara escarpment, a very warm spot when the wind is not north-east. On the 4th of June, I could not see a sign of its coming through the ground; on the 5th, I went to the country, about 26 miles north of this; they had more rain there, and *A. cornutus* was from three to six inches high; on the 7th, I saw my first *D. archippus* of the season, but they did not appear in any great numbers whilst I remained. On my return, I visited the west end on the 26th, there were a few flying about the weed, which was then from ten to fourteen inches in height with blossom clusters not yet expanded. I captured three—two males and a female, and saw a larva about one inch long and as thick as a wheat straw. In the same locality, on 3rd of July, I counted seven on the wing at one time, flying vigorously, and took two males, and felt sure from their movements the others were the same. On the 5th went east, milk-weed in full bloom, *archippus* abundant; captured two males, and suspected all the others to be the same; could find no larvæ; took fresh hatched *Milberti* and saw plenty of fresh *Atalanta*. Went west on the 7th, not many on the wing, and could find very few larvæ. Was at Guelph for ten days on the 16th, and visited the Agricultural College. Prof. Panton showed me chrysalids reared in confinement.

On the 21st, at the west end, captured a freshly hatched male; found no larvæ; leaves of weed showing little signs of being eaten. 25th, same place; butterflies plentiful; freshly hatched mingling with old broken ones; took a fresh female. East on the 27th; butterflies not plentiful; saw a few larvæ nearly full fed. 28th, west; not so plentiful as on the 25th. From the 2nd to the 18th of August, I was in the vicinity of Brantford—25 miles west from Hamilton; there were few *D. archippus* to be seen, but all were fresh; yet there was an abundance of *asclepias*. On the 20th, was at the west end; larvæ scarce; saw one not half an inch long; took one full fed, which suspended that night, and pupated the following night; there were very few *archippus* about the milk-weeds, which were now four and a-half and five feet high. From the 1st to the 17th of September I was 16 miles south of here; there I saw several fresh *archippus*, but not a single stalk of *asclepias*. On the 21st was at the west end; *archippus* had completely deserted the milk-weed; I saw some feeding in a garden some distance away. My impression has been for a good while that the butterflies care but little for the milk-weed to feed at; that they are there for breeding purposes principally; that they are but light feeders, with a great fondness for loitering in open woods, where there is apparently nothing for them to feed on. My last observation was made on the 15th of October; the milk-weeds were still green at top, but the lower leaves were all decayed. I have seen no butterflies since the 21st of September. J. Alston Moffat, Hamilton.

SOME COLEOPTERA NEW TO COLORADO.

Dear Sir: Dr. John Hamilton has been good enough recently to examine some Coleoptera which I collected in Custer County, Col., and among them he finds five specimens new to the State List. One, *Ditylus obscurus*, was obtained in the eastern portion of the county, the other four are from near Swift Creek, at 8,000 to 8,500 feet altitude, and are as follows: *Aphodius brevicollis*—which Dr. Hamilton says was previously known only by a single specimen found in Nebraska; *Hister Harrisii*, Kirby; *H. subopacus*, Lec.—three specimens obtained; and *Lebia vivida*, Bates. Among my beetles from Eastern Custer Co. was also an example of *Pityophagus verticalis*, which Dr. Hamilton says was previously known by a single specimen only.

Sept. 7th, 1888. T. D. A. Cockerell, West Cliff, Colorado

Mailed January 4th.

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THE LEPIDOPTEROUS FAUNÆ OF EUROPE AND NORTH AMERICA.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

The study of representative species of butterflies and moths shows us that very different grades of resemblance exist between allied forms inhabiting Europe and North America. I have shown that the modification shows itself sometimes mainly in the larval state ; again the perfect insects depart more or less strongly. I have also ventured to decide that these representative species are entitled to specific rank in our nomenclature. They fulfil the condition of species, since they do not intergrade, and they can be distinguished quite surely by competent specialists. The study of these representative species leads to the question of their relation, and we have seen that they may be regarded as survivals of a former northern, circumpolar fauna, which was broken up and driven southwards by the Ice Period of geologists. I have originally tried to show, in Silliman's Journal, that we have in our Lepidopterous fauna different elements. The representative species belong to this ancient circumpolar fauna. And here belong in part the identical species like *Vanessa antiopa* or *atlanta*. The identical species have remained unaltered, but certain species have been introduced by commerce, as the White Cabbage Butterfly and perhaps the Currant Borer, *Sesia tipuliformis*. The certain separation of these two sources of North American species belonging to the circumpolar element requires historical data which will hardly be forthcoming. The second element is that which comes to us from the south, a return wave of the migration southwards, which set in on the advent of the Glacial Age. This southern element is divisible into such forms as have already firm foothold, and such as the physical phenomena of the Gulf Stream, the prevailing air currents during the summer, land as wind-visitors upon our shores. *Erebus*, *Aletia*, *Euthisanotia*, among the moths, are more or less

partial breeders in our territory. How far north the permanent residence of the Cotton Moth obtains is not yet known. I am the first to point out that it is winter-killed over much of the territory which its summer migrations cover as a moth. I have seen how the migration takes place. The moths crawled out in numbers on my plantation during one or two days, and I anticipated a third and more destructive brood of caterpillars. The next morning not one perfect moth was to be seen. On the ground crawled a few cripples with unexpanded wings, to be killed by the sun and the ants. There was no third brood; the moths had migrated, been swept by the winds to the north during the night. I have alluded to the influence of the winds upon the time of arrival of the Cotton Moth on the Atlantic coast.

The "original" part of my work on the Cotton Worm was my discovery that it hibernated in the moth state; that it was winter-killed over a part of the territory it occupied both as larva and moth during the summer; that in the south it had no other food plant than cotton. I accounted for the moths in Canada in the fall by considering them wind-migrants. No alternative food plant is known in the north. In the south, as I originally stated, the worms migrate from eaten-out cotton fields, leaving the weeds and vines untouched, in search of fresh cotton. I identified the insect with the South American *Aletia argillacea* of Hübner, and stated my theory which I arrived at from a study of the habits of the moth and from a knowledge of the cotton plant itself, which like its parasite is not indigenous with us. Both have changed their normal condition. Man brought the cotton plant, which under culture and in our climate has become an annual, itself winter-killed in part, but so more productive of cotton; the winds brought the moth and the cultivated cotton fields supplied abundant food. I pointed out the yearly seasonal spread of the moth from south to north.

But to leave the special subject of the Cotton Worm, which is interesting by itself as illustrating one of the sources of the southern element in our Lepidopterous fauna, and to proceed with our analysis. The third element in our fauna is that which is North American *per se*, that is, which is descended from a pre-Glacial North American fauna, or which has become so modified from its original source as to be classed as North American. Here is a very difficult study in a consideration of the characters of our Lepidoptera. I have taken *Cressonia juglandis* as a

type of a North American moth descended from a pre-Glacial North American ancestor. I have taken *Datana* as an example of a North American moth which has become so modified from its original source as a member of the ancient circumpolar fauna, the first element in our present North American fauna, as to be now classed as North American. In the same group I take *Apatelodes* as an example of a North American moth which has become so modified from its original source as a member of the tropical, or South American fauna, as to be now classed as North American. The *Ceratocampinæ*, the genus *Hyperchiria*, I regard as ultimately of Southern origin. The genus *Catocala* belongs to the first element in our fauna; it is a development from a former circumpolar fauna.

But not to go further for the moment in this direction, let us compare the American and European butterflies and moths in a more general way, so as to arrive at some conclusion with regard to the departure from a common type in the members of the circumpolar fauna. The first thing which strikes us is the comparatively greater tendency to variation, to splitting into species which characterizes the North American butterflies and moths. Take the genus *Colias*, which belongs to the first element in our fauna; how it wanders into distinct forms, sometimes still connected, again no longer now members of the same reproductive cycle. Without Mr. W. H. Edwards's observations on the larva, we should be quite at sea.

But now, compare our protean *Colias* species with the two set European forms! What is true of *Colias* is true in other genera. Take the genus *Datana* among the moths; this is an American out-growth of the European *Phalera*. Now in Europe there are two closely allied forms of *Phalera*, *bucephala* and *bucephaloides*, but they are to be at once picked out by a slight but constant difference. In America we have six or seven species of *Datana*, and, if we take out *Angusii* and *perspicua*, as being distinguishable by general colour, all very near and difficult to distinguish as moths. In the genus *Clisiocampa*, the same phenomena are repeated. See how variable the underwings are and how much difference of opinion exists among writers! I am of opinion that *Catocala residua* is a good species, but Mr. Hulst is not with me here. At the best we can say, that Mr. Hulst, in regard to other species and varieties (e. g. *præclara*, *herodias*, *gisela*), has corrected himself and adopted my views, and that he will also probably come in time to agree with me in regard to *Alabamæ*,

Whitneyi and *residua*. We have seen, that the more correct determination of the moths alone is a matter of scientific experience, inborn feeling, in short of tact which comes alike from long work and genius for the study. The check to all such determinations of the perfect insects is breeding from the egg.

In the North American fauna, we also have the European genus *Scopelosoma* ; in Europe with one constant form, in North America with several closely allied. How thankful I am, that Mr. Thaxter has bred our closely allied species, so that no opinion formed from the imagines alone is now worth having or recording.

As the result of our comparison, we see the fact that species tend more to vary, to wander off into new forms in North America ; whereas, in Europe, they have a greater setness, or fixity in their appearance. It would seem as if the faunal changes in America had been greater, influenced by physical causes, the chain of longitudinal mountains, the land connection of the tropics, the course of the winds of the gulf stream, all the phenomena of climate and temperature. The probability is, that the European species are nearer the old circumpolar pre-glacial forms ; that in most cases the North American forms have made the variation, the step in a new direction.

Species by species, genus by genus, must these comparisons be made, so that we may unroll the probable past of our butterflies and moths. The life-histories must be known and compared. Work like that done by Mr. W. H. Edwards, Mr. Thaxter, Prof. French, Mr. Beutenmüller and others must be encouraged. Some papers by Mr. Moffat, on the question of species and variety naming, recommended themselves to me greatly. At the risk of repeating myself, I maintain that, as an entomologist, we are here to discriminate, not to lump ; our work is to talk about and illustrate the differences we find in insects.

An intelligent resolving of the study into its different phases is much needed. While with patience, the fine work of discriminating the forms is being carried on, the labour of comparisons, for the purpose of aiding the solution of wider questions, should not be neglected. There is enough to do, and I am glad to see, as the years go by and fresh workers come into our field, that there will be enough to do it. It is the pursuit of truth that is always new and interesting.

A NEW SPECIES OF NEONYMPHA.

BY G. H. FRENCH, CARBONDALE, ILL.

Neonympha Mitchellii n. sp.

Expanse of wings, male, 1.20 to 1.30 inches; female inches.

Male.—Upper surface grayish wood-brown, rather dark, without spots or marks, except that the spots on the underside of the hind wings and the dark lines bordering the terminal dark yellow line on the same wings show through a little. Fringes concolorous, in certain lights a little smoky tinged. Under surface slightly paler than the upper, a little more of the mouse order of color, sprinkled with buff scales. Both wings are crossed by four transverse brownish-yellow stripes, so dark on the fore wings as to be yellow-brown, occupying the same position as the same lines in its ally, *N. Areolatus*, the first and second uniting by a rounded end about a tenth of an inch from the inner margin of hind wings, the two outer—one terminal and the other sub-terminal—also uniting before reaching anal angle. In *Areolatus* these lines do not unite. Each of these lines has a dark brown (more or less distinct) fine bordering line on each side of it. The first line crosses the fore wings a little more than two-thirds the distance from the base of wing to end of cell, the hind wings about two-thirds. The second line crosses fore wing a little beyond the end of cell, the hind wings across the end of cell. The second and third are approximate anteriorily as in *Areolatus*. Fore wings with a row of four small ocelli between second and third lines, black, circled with pale Naples yellow or buff, the first varying from a dot, the size of an ordinary period, to about twice that diameter; in four examples circular, in two a little oval, in two a silvery metallic centre, the second a little more than twice the diameter of the first; in three examples circular, the other three slightly ovate, each with from one to three metallic points, when three present in the form of a triangle; the third averaging the size of the second, circular, with from one to two metallic points, when one central, when two in line with the row of spots; the fourth about one-fourth larger than the first, circular, all but one, which has the buff circle almost complete on the outside, but also a few buff scales outside the circle, a single metallic point to each of these.

Hind wings with six ocelli to each wing, circled with buff as those on

the fore wings. The first varying from a few buff scales, in one example, without the black centre, to twice or thrice the diameter of an ordinary period, circular, the largest with, in one example, a silvery metallic point; the second about .04 of an inch in diameter (the black portion), circular in four examples, in two a slight bulging in outer anal part, from one to five metallic scales, aggregated or scattered; the third from .06 to .07 of an inch in diameter, all nearly or quite circular, two silvery metallic points, in line with the ocelli; the fourth size of the third and the same shape. In each of these one example has a few black scales projecting into the buff annulus externally on one wing, points as in the third, except that in one the metallic scales are scattered on one wing; fifth of the size of the third, circular, in one example a few buff scales invade the black externally on one wing, in two other examples they are a little irregular in shape externally on both wings, two metallic points to each, with a few scattering scales in two examples; sixth about constant in size, as large as the largest of the first, one metallic point in all but one, ocellus, where the scales scatter a little, circular.

Body concolorous; antennæ above on basal two-thirds colour of wings, terminal orange shading into basal colour; beneath whitish, outer third orange; sides of basal two-thirds brown and whitish.

Female.—Differs from the male in being paler both above and below, and slightly in the arrangement of the transverse lines on the under side. In two of the four before me, the second and third lines distinctly unite with each other near the anal angle, while the lines by which the first and second, and the third and fourth unite are to be seen but are obscure. In one of the others there is no union between the second and third, while there is plain union between first and second, and third and fourth. The fourth has a distinct union between the first and second, and third and fourth, but the rounded ends of these unions touch. Both wings of the same example alike in this character. Ocelli as in the males, with about the same amount of variation.

This species differs from *A. Areolatus* in the following points:—In *Areolatus* the fore wing may have three ocelli and vary from that to many, while the hind wings have five. In *Mitchellii* four are always found on the under side of the fore wings, and six on hind wings in both sexes. In *Areolatus* the ocelli are elongate, the long part the long way of the wing. In *Mitchellii* they are all circular with only a little variation.

In *Areolatus* the metallic points in the ocelli are pale blue, and are arranged more or less in rows in the ocelli lengthwise of the wing. In *Mitchellii* they are, if in rows at all, across the wing. In *Areolatus* the transverse lines on the under side are ferruginous, and the second and third always unite near anal angle of hind wings. In *Mitchellii* they are more of a brownish-yellow ; in the males the second and third lines never unite, but the first and second, and the third and fourth always unite leaving a little space between their rounded ends ; in the females only one out of four had the second and third distinctly united. In *Areolatus* the metallic points are pale blue. In *Mitchellii* they are lighter, being more of a silvery colour, giving none of the real blue reflection, unless seen at a very oblique light, and then very pale.

Described from six males and four females taken by my friend, Professor J. N. Mitchell, in Cass County, Michigan, to whom I dedi cate the species. They were found in upland dry meadows, about ten miles from the Indiana line. Professor Mitchell is of the opinion that the species has been found as far north as Kent County, Michigan.

TWO NEW SPECIES OF TINEIDÆ FROM THE ALEUTIAN ISLANDS.

BY WM. BEUTENMULLER, NEW YORK.

Cerostoma Aleutianella, n. sp.

Head and palpi olive gray ; legs olive gray, tibiæ annulated with fuscous ; body fuscous. Primaries olive gray, becoming paler toward the outer margin ; above the fold is a broken fuscous basal streak, running to a little beyond the middle of the wing ; at the end of the cell a small fuscous spot, limited beneath by a white patch. Cilia olive gray. Secondaries grayish fuscous. Underside of wings grayish fuscous. Cilia of the primaries tipped with greenish gray.

Expanse 20 mm. 1 ♂. Coll., Hy. Edw.

Cerostoma Dubiosella, n. sp.

Head, thorax and palpi fuscous. Primaries grayish fuscous, thickly covered with deep fuscous scales ; before the outer margin a few white and black scales. Secondaries grayish fuscous, as are also the underside of the wings.

Expanse 18 mm. One example. Coll. Hy. Edw.

NOTES ON BOMBYCIDÆ.

BY FREDERICK CLARKSON, NEW YORK.

The habits of insects present an attractive and fruitful field of discovery, illustrating in many remarkable ways their peculiar instincts governed by heredity, and more or less conditioned by environment. The power which we call instinct, controlling the habits of insects, has a regularity of action governed by ordinary conditions, but there are frequent manifestations of adaptation to circumstance, as conspicuous in the several orders of insects as in the various races of mankind. The extraordinary condition can only be regarded as an obstruction to the usual law that governs instinct, and compels the creature to conform to the changed surroundings. The larvæ of *Bombyx mori* if crowded for space at the time of pupation will associate to the number of three or four in spinning the one cocoon which covers them. The larvæ of *Samia cynthia* under like environment present a similar variation of habit by spinning interior sections one above the other in the silk-lined leaf constituting the one envelope, so that outwardly it has the appearance of a long, single cocoon. The marked feature of this dual cocoon is, that while ordinarily the place of escape for the imago is at the upper end of the cocoon, the inhabitant of the lower section emerges at the lower end of the cocoon, from the lower end of its section. The *Cynthia* worms occasionally, from like necessity, will, to the number of two, spin a cocoon in common and undergo transformation in the one interior section. I have collected the past season very diminutive cocoons of *P. cecropia* and *S. cynthia*, the former measuring one and one-half inches long by one-half inch in diameter; the interior section three-quarters of an inch long by three-eighths of an inch in diameter; the latter was spun on a leaf one and one-half inches long, the cocoon rather less by three-eighths of an inch in diameter. The cocoons contained the larva dead and in a dried condition.

From a cocoon of *P. cecropia* I have obtained a very small male, measuring scarcely four inches in expanse of wing. The kidney-shaped spots on secondaries are reversed from their usual position, the pointed end being directed towards the abdominal or inner margin, instead of as commonly to the exterior margin. The wavy white line, bordered with black, on the exterior margin of the primaries, which is usually more or less pointed into the adjoining lilac, is in this specimen a line corresponding in form with that of the margin of the wing.

NOTES ON COLEOPTERA.—No. 5.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Cicindela. A glance over the catalogue shows many names marked as varieties of others, and a glance into the boxes of any fair collection shows these same to have a diversity of appearance, that in many instances requires an educated experience to reconcile with their being specifically identical; as for example, a green *C. sex-guttata* and a black *consentanea*, or an immaculate green *unicolor* and a black *modesta*. With systematists, size, color and markings have no primary weight in specific identity; that is, when the species are not *made*. It is not here purposed to enter on the relation of races, the determining causes of which are beyond reasonable conjecture and must have been indefinitely remote, since hereditary reversion to a common ancestral type is obsolete, and many varieties breed true to themselves without producing any of the others; but, to protest against the practice some collectors have of ignoring varieties in making exchanges, as sending *vulturina* or *prasina* instead of *obsoleta;* and to advise that they be treated as species. Indeed it is quite possible when their internal anatomy is better known and structures like the sexual organs studied and used in systematic work, as has been done by Dr. Horn in *Corphyra*, some of these varieties may turn out to be species. I take var. *consentanea* and var. *modesta* abundantly in the pine woods of New Jersey near the coast, basking in the sunshine on the white sand, but neither *sex-guttata*, nor *scutellaris*, nor any intervening varieties are found near there, and I doubt greatly whether the opposite sexes would recognize relationship or produce fertile offspring. *C. repanda* and var. *12-guttata* are found in great plenty here and do not appear to mingle, each race confining itself to its own territory—the former to the river shore and benches, the latter to the rocky creeks and adjacent plateaus—and are not known to hybridize or in any way acknowledge kinship. The above recommendation is intended to apply to the other families of Coleoptera as well as to Cicindela, and it is believed every race that is distinct should have a name for the convenience of collectors, if for no other purpose.

Dyschirius. The following, with the other named beetles, were taken Aug. 27th, on Brigantine Island, N. J., in a salt marsh on a sandy spot about three feet by two and elevated some six inches above the level of

the ordinary tides: *D. sphæricollis*, 7 sp.; *D. pallipennis*, 2 sp.; *D. filiformis*, 1 sp.; *D. pumilus*, 10 sp.; *Clivina striatopunctata*, 5 sp.; *Bledius politus*, 16 sp.; *B. basalis*, 20 sp.; *Trogophlœus?* sp., 12 spec.; *Rhyssematus scaber*, 18 sp.; many *Bledius maxillosus* around the base were not collected. The *Dyschirius*, *Clivina* and *Bledius* burrow only deep enough in the moist sand to fairly cover themselves, and their presence is known by the little mounds at the entrance of their excavations. In life the elytra of *Bledius basalis* are pearly white, with the basal declivity black; those of *B. politus* are reddish-yellow and shining, and the thorax is ferruginous, and it may be known from all others of its size by the deep thoracic channel and the sparse coarse punctuation of the thorax and elytra; the head of the male is large, and tuberculate between the ocular ridges; both species extend southward along the coast to Florida. *Rhyssematus scaber* does not burrow, but lives beneath a thin layer of a confervoid growth that forms on the marshes and about the roots of grass. This little beetle feigns death so persistently that I never saw one move in the least, and the only other Aphodide I know of that has this habit is *Dialytes striatulus*.

Lebia vivida Bates. A specimen of this beautiful little beetle, described from Mexico and introduced into our catalogue on the strength of two specimens taken in Arizona, is in my collection through the kindness of Mr. T. D. A. Cockerell, taken by him in Custer Co., Col., at an elevation of some 8,000 feet, thus showing that it belongs to the fauna of the Rocky Mountains.

Cychrus Lecontei Dej. Most of the Carabidæ have a regular time of appearance, but this does not seem to be the case with *Lecontei*, bright new specimens of which may be found from April to December. I have found them paired in November, in April, and at various times during the summer. It hibernates, as is well known, in logs and under moss and stones.

Chlænius Pennsylvanicus Say is subject to considerable variation in color, size and sculpture, but nothing is seemingly stable enough to form a race or true variety. One of these variations I was once disposed to regard as a species till set right by Dr. Horn. It has pale epipleura, and the side margins of the ventral segments rufous, like *Circumcinctus;* the outer three intervals of the elytra are dark green, contrasting with the the dark disk. It occurs here in summer on the river beach, and I have

not seen it inland. I have specimens of it from Missouri, New York and Canada labelled in error, *tricolor*.

Harpalus vulpeculus Say appears late in the season, and then the thorax is rufous, but becomes black in some individuals after hibernating. This tendency to *melanism* has not been observed in *H. dichrous*, which occurs with it, and has likewise a rufous thorax. *Stenolophus conjunctus* appears in summer and autumn, and then its thorax is rufous; in the fall it becomes gregarious, and winters under rails and stones in grassy places, after which the thorax is entirely black.

Tachycellus Kirbyi Horn is not met with every day, as it lives in grassy places in boggy swamps in their natural state, mostly inaccessible except in the dry part of the season. It is usually found about the roots of tufts of grass. A good way to take swamp beetles is to spread an armful of cut grass over some wet, bare place in the swamp, and on turning it over every three or four days some otherwise rare insects may be taken, as *Pterostichus patruelis*, which here inhabits swamps. Along with it is found plentifully a common species of *Stenolophus*, yet undescribed, that goes in with *ochropezus* or *plebeius*, as the collector fancies.

Pocadius helvolus Er. Whoever desires this beetle may take it during August in a growing *Licoperdon*, which when ripe is commonly known as puff-ball. A dozen or more are often taken in a single one, and are of all colors from ferruginous to nearly black; but young puff-balls are not always plentyful, and when found not more than one in twenty contains beetles, which need not be greatly regretted by the collector if he is anything of an epicure.

Pityophagus verticalis Horn was described from a single specimen from Colorado, the absence in which of the small spinules on the external edge of the tibiæ seen in the other species was attributed to probable abrasion. From Mr. T. D. A. Cockerell I have received from Custer County, in the same State, an apparently perfect specimen in which there is no trace of these spinules. This character, when more specimens of this and *rufipennis* occur, may, apart from color, have chiefly to be depended on to separate the species, as from the specimens before me it is doubtful whether the cephalic characters will do it in all cases. In this specimen of *verticalis* the vertical fovea is rather an elongate impression with a fine line extending on the occiput. In three specimens of *rufipennis* from California the fine occipital line is absent in two and only discernible

in the third, but well marked in one from Oregon; while in one specimen there is a very obvious frontal impression, much like that in this *verticalis*. In both species the head is transversely impressed posteriorly, and the pygidium concave with a much raised hind border.

Aphodius marginatus Lec. This fine species was described from a unique, and by Dr. Horn in his monograph, from the type and another specimen, both from eastern Nevada, and supposed to be females. Through the favor of Mr. Cockerell, who collects in Custer County, Col., at elevations of from 6,000 to 8,000 feet and upward, I have a specimen that appears to be a male. It differs from the type by having the front distinctly tri-tuberculate, and a fine basal thoracic marginal line evident at the middle, but obsolete near the sides; the punctulation of the thorax and elytral intervals is exceedingly fine, and cannot be seen by the unaided eye; there are large coarse punctures disposed in clusters along the sides and base of the thorax, but absent from a large triangular space on the disk with its apex posterior; also a depression or concavity at the front as well as the hind angles.

Ligyrus relictus Say. Walking on the river beach in August, I turned over a shingle on a small sandy place about which some grass was growing, under it were seven *Harpalus caliginosus*, and the elytra and other remains of several *L. relictus* which they had devoured. Noticing the sand to have been much disturbed I dug down and soon turned out twenty-seven of the beetles named, which were buried from two to four inches deep over an area of about ten by sixteen inches, and of both sexes. Other similar spots were investigated without results. Now is this a known and common habit? What is its purpose in the economy of the insect? Did the *Harpalus* kill those they feasted upon? *L. relictus*, also *Chalepus trachypygus* and an occasional *Polymœchus brevipes* come to the electric lights in the city, but *relictus* flies also by day in the warmest sunshine, especially along the river.

Leptura haematites Newm., *nana* Newm., *exigua* Newm., *saucia* Lec., *subargentata* Kirby, *similis* Kirby, *ruficeps* Lec., and *rhodopus* Lec. These names have long been a source of perplexity to collectors and of no little confusion. Dr. Horn (*Entomol. American* i., 8) recognizes only three species, *haematites*, *exigna* and *subargentata*, placing five others in synonymy—*nana* and *saucia* with *exigna*, and *rhodopus*, *ruficeps* and *similis* with *subargentata*. This leaves a very common species here and

northward through Canada without a name. *L. haematites*, with its red thorax, is well known, occurring abundantly on *Cratægus* and other blossoms in the spring. Its sexual differences consist in the thorax of the male being much longer than that of the female, and anteriorly narrowed The unnamed species is similar in size (.18 to .22 inch in length), and has the same sexual characters, but the thorax and elytra are concolorous, being black, or brownish black, with cinereous pubescence. These two species are frequently taken together, and were the thorax of the same color could not be separated by any character yet discovered. I have the unnamed species from New York, Canada and elsewhere labelled *subargentata*, or *similis*, according to the color of the feet. *L. subargentata* is, however, a very different insect, though having the same sexual characters. It is much larger (.26 to .30 inch in length), blacker, more coarsely punctured and sparsely pubescent, occurring more commonly in northern Canada and the Rocky Mountain region to Mexico. In all these species the legs vary from black to rufous, and the colour is of no value. *L. exigua* does not belong to this group, having different sexual characters; the male has the last ventral segment convex at middle and impressed at tip, and in front of the impression a mucronate tubercle projected backwards; this, and the black spot on the thorax surrounded by golden pubescence, easily separate it (L. .24 inch). The unnamed species is probably in most collections by some name.

Leptura Zebra Oliv. July 6th. Several females taken ovipositing on a white oak stump made the preceding spring.

Agasphærops nigra Horn. Among a number of Rhyncophora from Vancouver Island, B. C., from Rev. Geo. W. Taylor, there was a specimen of this singular insect, so like *Otiorhynchus sulcatus* that I passed it by as such till the unknown forms were examined. The genus and species were founded on two specimens taken at Mendocino, Cal. This specimen differs a little from the types being a little larger (.34 inch); the tubercles on the thorax are not very close, each being about the size of a No. 2 to 3 Klæger pin head, flattened on the top, and bearing a deep puncture; the elytral intervals are composed of single rows of tubercles equally as large and similarly punctured. On the thorax and elytra there is a pattern of white and golden scales similar to that seen in *Hormorus undulatus*, but they are sparser and less conspicuous; these scales are easily rubbed off, which may have been the case with the types before they were seen,

otherwise this might be regarded as a second species. The beak is sulcate like *Otiorhynchus sulcatus*, but twice the length, and the scape of the antennæ scarcely reaches the eye. The elytral ornamentation of *sulcatus* is less noticeable and more pubescent like, and none of the tubercles of the thorax and elytra, which are much smaller, are perforate, those of the intervals being arranged in irregular clusters.

Conotrachelus naso Lec. I am not aware of a record of this species occurring in the Northern States. Last year and also the present I bred it from the fruit of *cratægus*—haws—as well as *C. posticatus*. The species are very close and are best separated by the two yellowish white spots on the thorax of *naso*. *C. cratægi* is, however, the great haw worm next to the larvæ of the Lepidopterous *Grapholitha prunivora* Mels., which developes with, but a couple of weeks later, than the beetles.

DESCRIPTION OF THE LARVA OF DATANA MAJOR G. & R.

BY HARRISON G. DYAR, RHINEBECK, N. Y.

Young larva.—Body dark reddish, inclining to black; otherwise as in the following stage.

Before last moult.—Body black or reddish black, with eight longitudinal clear white stripes, as broad as the intervening spaces or broader, with the exception of the dorsal space. Beneath are three partly obsolete white lines, two of them interrupted by the legs. The head and cervical shield all dark mahogany red, as are also the abdominal feet, the bases of the thoracic feet and two spots on segments 4, 5, 10 and 11. Thoracic feet black. The anal plates are black or dark mahogany red; sparsely distributed white hairs. Length about 30 m.m.

Mature larva.—Body black; stripes broken into a series of irregularly square or rectangular white spots. In the three upper rows on each side these spots occur two on each segment situated near the edges of the segment. The lower row consists of a spot before the spiracle, alternating with an elongated one overlapping on two segments, so that these spots nearly alternate with those of the upper rows. Head, cervical shield, anal plates, all feet (except thoracic) with their bases and two spots on segments 4, 5, 10 and 11, dark mahogany red. Below are a few white dots representing the usual stripes. Scattered whitish hairs. Length about 60 m.m.

There is a variety in which the stripes, and later the spots, are bright lemon yellow instead of white. The colour seems to be constant for an individual. The larvæ live together in rather small swarms, not exceeding fifty, till after the last moult, when they separate, often leaving the food-plant to ascend another in the vicinity. They then feed singly to maturity.

Food-plant, *Andromeda ligustrina*.

NOTES ON SOME CALIFORNIA MOTHS.

BY G. H. FRENCH, CARBONDALE, ILL.

Arctia Shastaensis Behrens, MS., nov. var. or nov. sp.

This new form was found by my friend, Mr. James Behrens, of San Francisco, at Upper Soda Springs, Siskiyou County, near Mount Shasta. The hind wings and abdomen are wanting, but the fore wings are present and in a very fair state of preservation. They are black, without light markings on the veins, but marked with yellow as follows:—A very broad transverse stripe, the basal of the usual three found in *A. Achaia* and *A. Behrii*, as wide as the female of *Behrii*, but more regular along its edges and curved more as this stripe is in *Achaia*, and not extending out on the costa as does this stripe in *Behrii;* the second of the three usual stripes is absent, save a few yellow scales on the sub-costal vein; the third is present, but narrow, arcuate, does not quite reach the costa, and only comes a little below the streak along median vein to posterior angle, a little attenuated at both ends; the usual longitudinal stripe below median vein, not reaching the base as this stripe does in both *Achaia* and *Behrii*, but beginning just inside the broad stripe, where it almost connects with an outward curved half line inside the broad stripe, that is broad on costa, but narrow below, outside the broad stripe the stripe is narrow, and on one wing broken before reaching posterior angle; the M-mark present much as in *Behrii*, beginning on costa midway between stripe three and apex, the first bar of the M curved inward, the other two outward and joined together and to the third stripe, the fourth bar absent as the spur that is usually sent out from the sub-median stripe is here absent. Fringes black; head, thorax and patagia black. Beneath as above, only paler. Legs black, except inside of anterior femora, which are yellowish.

The basal half line and fringes being black with the broad basal stripe would point to this insect being a variety of *A. Behrii*, as also the black body parts, but the downward curving of the sub-median stripe before reaching posterior angle ally it to *Achaia*; unlike either of these, it has no yellow along the posterior margin.

Apatela Felina Grote.

Mr. Grote describes this insect in vol. 5, No. 2, page 208, of the Government Survey Bulletins, comparing it with its ally, *A. Lepusculina*. Having several bred specimens, I make here a few additions to Mr. Grote's description.

The fore wings are distinctly blueish-gray, and the marks are more obliterate than in the usual *Lepusculina*. The female has scarcely a trace of the sub-terminal line, even in whitish shading; but one male has the sub-terminal line nearly as distinct as in *Lepusculina*, like that interspace ally arcuate, but bending inward only about half as far on the second median interspace, and consequently the line is not so far from the outer margin, below this vein as in *Lepusculina*. The psi mark is less distinct. Reniform obsolete, except a curved mark, part of the inner or basal portion of the annulus. One male has on one wing almost a perfect orbicular but faint. It is elliptical, the long diameter parallel with costa and much narrower than the same in *Lepusculina*. Hind wings of male white, soiled terminally and along the veins; of female so much soiled as to be gray. The fringes of both wings concolorous, checkered with black.

CANADIAN COLEOPTERA.

The Council of the Entomological Society of Ontario has decided upon rearranging the Society's collection of Coleoptera according to Henshaw's List. This will necessitate the entire reprinting of the "List of Canadian Coleoptera," and as it is desirable that the new list should be as full and as correct as possible, our friends will confer a great favour by forwarding to the Secretary a list of all new names of Canadian beetles that they may have obtained by correct identification. As it is necessary that the list should be placed in the hands of the printers with as little delay as possible, our readers are desired to reply to this request at once. Henshaw's numbers will be printed on the new list, which will be for sale in sets when completed.

MR. SMITH ON CERATHOSIA.

BY A. R. GROTE, A. M., BREMEN.

In reply to Mr. Smith's paper, somewhat inappropriately styled "*Arctiidæ vs. Noctuidæ*," I would state that my original paper in Entom. Amer. on *Cerathosia* had for its *main* object the pointing out of the errors contained in Mr. Smith's original description of the genus in the neuration. When these errors are corrected according to my statements (which latter in the main seem to be acknowledged by Mr. Smith as correct), the probability that the moth is an *Arctian* next to *Utetheisa* is weakened, and, as I have shown it is not a Lithosian, the chances are we must look for its position elsewhere. The *secondary* object of my paper was to suggest that we might find a better place for *Cerathosia* next to *Acopa*, etc., in the Noctuidæ. Now, in reply to Mr. Moeschler, and Mr. Smith, I have to say, that I did not discuss vein 8 of *Cerathosia*. I have also to complain that Mr. Smith is an unfair writer, who indulges in large expressions of condemnation upon small grounds (as for instance the fact that some Lithosians have an accessory cell, while I give no accessory cell as a character of the sub-family), and above all a writer who misrepresents the party he desires to criticize. Mr. Smith alludes to a paper on *Cerathosia* "not yet reached." I advise him when that paper is reached, to have any statement it may contain as to the neuration of *Cerathosia* corrected according to my original corrections. I have no objections to my writings being "handled without gloves," as Prof. Fernald says Mr. Smith does, when the criticism is fair and reasonable.

A FINAL WORD ABOUT THE GENUS RILEYA.

BY WM. H. ASHMEAD.

In the last issue of the CAN. ENT. Mr. Howard, with a commendable solicitude for my entomological reputation, and under a heavy discharge of deadly parallel columns, seeks to evade the question at issue between us, *i. e., who has priority in the use of the generic term Rileya;* and notwithstanding the opportunity was afforded him to rechristen his interesting genus, he seems loath to do so, and again, by a misrepresentation, makes a claim of priority in publication.

Had Mr. Howard written *read* instead of "published," he would have been nearer the truth. However, this may have been another *lapsus*

pennæ. *His* published description first appeared in the October number of the CAN. ENT., nearly five months after the publication of "my synoptic tables," as previously pointed out by me, and the points claimed by him are without value.

In order to close a controversy that has already assumed an inconsistent warmth, I now propose for Mr. Howard's genus the name *Chrysoplatycerus*, and the species may in future be known as *Chrysoplatycerus splendens* Howard.

CORRESPONDENCE.

A FLOCK OF BUTTERFLIES.

Dear Sir: While in the interior of New Guinea, in Aug., 1883, I observed what might properly be called a flock of butterflies. They were apparently of one species* (of a dark brown color, with a blue reflection on the fore wings in a certain light), and in such great numbers as to actually blacken the green bushes on which they lit. I first came across them one day, while out after birds, in a thick and shaded part of the tall forest, in low land adjoining the Laloki river. Being so numerous, I supposed it would be an easy matter to catch all I desired without the aid of a net, but after several unsuccessful attempts, in which case they would rise in a cloud and settle again in a few moments on the bushes close at hand, I was obliged to give it up. They did not seem to be very much disturbed at my approach, but would not, however, allow me to get very near without taking flight. As soon as I remained still, they would immediately settle on bushes and foliage close by, but always out of reach. The flock was, perhaps, two acres in extent, but the butterflies were not equally numerous over this entire area. In some places every bush, branch, twig and leaf seemed to be covered with them, while in others there were comparatively few. What their object was, or how long they remained in that locality, I am unable to say, except that in visiting the place several days afterwards, they were still there in apparently undiminished numbers. I might add none were seen feeding, and, so far as I observed, there were no flowers in bloom anywhere in the vicinity.

S. W. DENTON, Wellesley, Mass.

*The name is unknown to me, but I have a specimen of this butterfly which, if returned, I will send to any person who is capable and willing to determine it.

ARZAMA OBLIQUATA.

Dear Sir: The recent communications of Mr. Brehme and Mr. Moffat (CAN. ENT. xx.–119, 130, 180, 238), have revived my interest in the habits of *Arzama Obliquata*, G. and R. At the Minneapolis meeting Entomological Club A. A. A. S. (1883), the habits of the insect were discussed at some length, principally by Dr. Riley and myself. So much of the discussion as the Secretary considered worth printing, may be found in Vol. xv. of the CAN. ENT., pp. 171 and 174. The only difference worth noticing between us was in regard to whether there are two broods annually or one. It was finally agreed that both were correct—quite unusual in matters of this kind! In all probability, about Washington there are two, whilst in Western New York there is but one; if this be so, some of the apparent discrepancies of your correspondents may be cleared up. Mr. Brehme describes the egg, and Dr. Riley the masses of eggs (xv.-171). It would be of interest if Mr. Brehme would communicate the manner of occurrence of the eggs. I have not been so fortunate as to find these bodies, but have followed the quite young larvæ to maturity. I feel sure that it is single brooded in New York and Canada, and that the mature larva in the fall swims to land if necessary (see xv.-174), and crawls into loose earth, or preferably into old wood, or under rubbish where it remains until spring, transforming in May. I have ransacked *Typha* stalks at all seasons for borers, and do not remember to have found this larva, nor have I any notes stating that it was ever found as larva late in autumn or in spring within the stalks, or that it was found to transform in the same. Whatever the habits may be in New Jersey, or at Washington, I have evidence which confirms the correctness of Mr. Moffat's impressions of the habits of the species in his latitude.

Dec. 17, 1888. D. S. KELLICOTT, Columbus, Ohio.

PIERIS ILAIRE, GODT.

Dear Sir: I wish to record in your valuable journal the capture of *Pieris ilaire* Godt. at Lancaster, N. Y. The accidental occurrence of such southern forms at this northern locality has a certain interest which, I think, will warrant this notice. The present specimen was taken fluttering around a corn field on the 22nd of September, 1880. For about a

week previously warm southerly winds had prevailed with little or no rain, followed by a light frost on the morning of the 21st. At first sight of the butterfly I recognized it as a stranger to our neighbourhood, and with care succeeded in capturing it without further injury, if indeed such were possible, as it was already a woeful looking object, the wings were torn and badly denuded, and the poor creature hardly had the strength to support itself the few yards it attempted to fly. For eight years I have kept this sorry looking treasure hoping some day to learn its name and history, and in this I have at last been successful. Poey gives a good figure of the female in his *Centurie des Lepidopteres de l'Ile de Cuba*, and it is well described by Boisduval in his *Species gen. des Lepidopteres*, vol. 1, p. 491. The present example is a large female with the black border of the wings unusually broad, which variation is mentioned by Boisduval. The most northern habitat that I can find is given in French's Butterflies of the Eastern United States, as "Indian River, Florida, Texas and Arizona," but I have had little opportunity for investigating the subject, and it may be a more common visitor in the north than I imagine. Prof. Grote, in his charming paper on the Geographical Distribution of the N. A. Lepidoptera, published in the eighteenth volume of this journal, has given us a very serviceable classification of the origin of the N. A. fauna. Probably *P. ilaire* pertains to the fourth table of his third category (p. 236), at least two of the species there enumerated appear to have been taken here, viz., *Thysania zenobia* and *Brotis vulneraria*. If, however, it breeds continuously in the Southern States, its association with *Erebus odora* in Grote's second table (p. 235) would seem more natural, and would render its occurrence here less surprising.

E. P. Van Duzee, Buffalo, N. Y.

The second paper on "Popular and Economic Entomology," which was promised for this number, has been prepared by Mr. Fletcher, but owing to the cuts required for its illustration being in the hands of the printers of the Annual Report at Toronto, it has been found necessary at the last moment to defer it till next month.

Mailed February 9th.

The Canadian Entomologist.

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DESCRIPTION OF THE PREPARATORY STAGES OF COLIAS MEADII, EDWARDS.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Fusiform, thick in the middle, tapering to a small rounded summit, the base small, flat; ribbed longitudinally after the manner of the genus; colour yellow-green. Duration of this stage four to five days.

YOUNG LARVA.—Length, at 24 hours from egg, .06 inch; cylindrical, even; colour brown-green; thickly covered with black points, from each of which a short fine hair; head rounded, blackish-brown. Duration of this stage five days.

After First Moult.—Length at 12 hours .11 inch; colour dull brown-green; the ridges thickly set with black points, each with short grey hair; head brown-yellow. To next moult six days.

After Second Moult.—Length at 12 hours .16 inch; colour dark green, covered with yellow points so thickly as to give a yellow hue to the whole surface, each point with hair; a mid-dorsal dark stripe; a faint indication of a yellow sub-dorsal line; so also of a basal stripe; head green-brown with many fine tubercles and hairs. To next moult about six days.

After Third Moult.—Length at 12 hours, .22 inch; along the underside of the indistinct sub-dorsal yellow line is an ill-defined row of black spots, one to each segment from 3 to 11; the basal ridge yellowish, but not yet showing a clear band. Later in the stage the black spots show clearly, those on 3 and 4 largest, the rest diminishing regularly to a very small one on 11; head as before. To next moult five to seven days

After Fourth Moult.—Length at 6 hours .46 inch; at 24 hours .52 inch.

MATURE LARVA.—Length .7 inch; cylindrical; nearly even; on the flattened ridges are many points, each giving a short black hair; colour

dark yellow-green, the effect of the black hairs being to make the body darker than in most species of the genus; a pale yellow narrow sub-dorsal stripe, under which from 2 or 3 to 12 is a black spot on each segment, the anterior ones largest, the others gradually lessening in size to the last; along base a narrow white stripe; under side, feet and pro-legs green; head rounded, a little depressed at top; colour green, lighter than body, much covered with black tubercles with black hairs. From fourth moult to pupation five days.

CHRYSALIS.—Length .66 inch; breadth across mesonotum .16 inch, across abdomen .18 inch; greatest depth .22 inch; shape of the genus; compressed laterally, the thorax on ventral side prominent; head case pointed, beak-like, the projection less prolonged than in some or most species observed; mesonotum rounded, carinated, the sides sloping, a little convex; followed by a shallow depression; abdomen conical; colour green-yellow, all the ventral side being brighter than the dorsal, and the projection at head quite yellow; a mid-dorsal darker line, and a faint sub-dorsal line; all the dorsal side and the ventral of abdomen dotted and mottled whitish, the wing cases and ventral side to head finely granulated. Duration of this stage, in the only case where the butterfly appeared the same season in which the egg was laid, six days.

This alpine species is found in the Rocky Mountains, in Colorado, and probable throughout the range to British America. Certainly it is if *Elis*, Strecker, is synonymous with it, as I believe to be the case. Mr. Mead first took this Colias on top of the "divide" between the Platte and Arkansas valleys, about 12,000 feet elevation, and says he took none lower than at 10,000 feet. Mr. Bruce says the proper habitat is from 11,000 to 12,000 feet, though, when the butterflies get into the narrow canons, they will follow the track down to 9,000 feet at least, and mentions (CAN. ENT., xix., 228) having taken several at Webster, at 9,000.

I received a number of young larvæ, 23rd July, 1888, from Mr. W. S. Foster, at Salida, Col., which had hatched en route. The female was taken on Marsha'l Peak, 11,000 feet, 15th July, and confined over Astragalus. One of these larvæ passed first moult 27th July, the third moult 9th August (the second not observed), the fourth moult 14th August, pupated on 19th, and a female imago came forth 25th August. But the other larvæ, by 28th August, were in lethargy, and soon after

were sent to Clifton Springs, New York, to go in the refrigerating house, and there they are at this writing.

I had previously had eggs of the species from Mr. David Bruce, 25th July, 1886, laid on 21st and 22nd July, and which hatched 26th. On 31st July several of the larvæ passed first moult; on 6th August began to pass second; on 15th, the third. None of these went to pupæ, but all were asleep early in September, and were sent to New York, but were dead when I received them the following March.

The egg and pupa are like the same stages of *Philodice* in shape; the larva is darker than any Colias I know of, and there is no red in the basal stripe. The sub-dorsal line is not very distinct, but its place is indicated by the row of black spots next it on lower side.

I had no difficulty in rearing these larvæ on white clover, but at same time, in 1888, could not induce larvæ of *C. Scudderii* to eat clover or any other plant, and all died. The same was the case with *C. interior*. Mr. Fletcher and Mr. Scudder both also found it impossible to get larvæ of *interior* to eat of any plant, though they offered everything any Colias is known to eat that was procurable. These two larvæ are the only Colias known to me that will not freely eat white clover or else Amorpha.

COLIAS CÆSONIA, Stoll.

BY JEROME M'NEILL, MOLINE, ILL.

Somewhat to my surprise I found this species not uncommon here during the collecting season of 1887. Although my entomological interest lies in another direction, and I have, consequently, made no special effort to obtain Lepidoptera, I find I have ten specimens of this striking *Colias* in my collection, all of which I have taken during the summer and fall of 1887. On looking over the collection I discover that these specimens were taken at three different times. One—a very much worn specimen, with one hind wing gone—was captured the sixth of June, on Rock Island; six specimens were taken on the twenty-third of July in an upland clover field, two miles south-west of Moline. They are all fresh and bright, and were found in company with *C. philodice*, *Papilio chresphontes*, *P. turnus* and *Danais archippus*. The last three were taken September the sixteenth, in a low-lying field, on the banks of the Mississippi, three miles

east of Moline. These specimens are, if possible, fresher than those taken July twenty-third. This species would, therefore, seem to be three brooded in this latitude. There are also certain marked differences in coloration, which may or may not be distinguishing characteristics of seasonal varieties. The spring form, as it is represented by the single specimen referred to, is distinguished by the absence of any indication of the sub-marginal row of spots or points on the underside of the wings or any trace of orange, except the two spots on the upper surface of the hind wings; the rose pink ray extending outwards from the body on the hind wings is present. The summer form, as it is represented by the six individuals in my collection, is marked as follows:—The sub-marginal row of spots on the under surface of the wings are none of them pink; those in the interspaces of the first and second, and second and third ediman veinlets, being black, the others brown; the pink stripe on the under side of the hind wings is entirely wanting, and there is on the upper surface of the hind wings a sub-marginal area of orange, bright or faint, which sometimes extends from the marginal black band nearly to the orange discal spot. There is also in all of these specimens a clearly defined oblong raised patch of scales of peculiar form extending along the upper side of the sub-costal vein of the hind wing, from the costal vein to the branching of the first sub-costal veinlet. These scales seem to stand on end, and although I have not satisfied myself of the fact, I think it is probably that these scale-like bodies, are excrescences on the true scales. This patch of scales seems to be confined to the males. It varies in colour from yellow to reddish-orange. When it is yellow it is concolorous with the adjacent surface, and not conspicuous, although the raised margin of the outer edge is always very distinct on a closer examination. In the single specimen of mine in which this area is reddish-orange, it is scarcely less conspicuous than the "dog's head" when the anterior wings are pulled forward far enough to expose it. Since it is present in all the males and absent in all the females I have collected, I take for granted it is a sexual mark. If this character has been described before, I have no knowledge of the description, though it seems strange that it should have been overlooked. Its presence would support Mr. Strecker and others in removing the species from *Colias*. In the fall form, as represented by the three specimens taken September sixteenth, the brown spots on the under sides of the wings are replaced by pink; the two black spots between the first and second, and second and third median veinlets, remaining unchanged; the

pink stripe on the under side of the hind wings is prominent, and both pairs of wings are margined with a narrow stripe, in some places a mere line of pink extending on the primaries from near the base along the costal and outer margins to the anal angle, and on the secondaries along the anterior and outer margins to the anal angle. On the upper side of the hind wings the distribution of orange is very similar to that in the summer form, but the marginal band of black, which in the latter is comparatively broad and dentated within in the fall form, is narrow and interrupted by the veinlets, so that it is really composed of a series of spots, sub-triangular in shape, with the apex acute and sometimes prolonged into a narrow line which extends into the orange as much as three-sixteenths of an inch. The coloration of the female of this series is so remarkable that it seems to deserve a name, as apparently a dimorphic or at least an aberrant form, and I propose that it be called *rosa*, if it should be found to be a constant variation. The upper surface of the primaries does not differ essentially from the type. The whole upper surface of the secondaries is powdered with brownish-black and orange scales. The black scales are more thickly clustered between the discal orange spot, which is partially obscured by them, and the outer margin. This very much broadened band only partially and unequally obscures the yellow ground colour so that it includes within it a sub-marginal row of large, round, yellow spots, about four in number. The under side of the primaries have the "bright yellow" of the apical portion replaced by bright, deep-rose pink. The under sides of the secondaries are completely suffused with pink, the greenish-yellow scales of the ground colour being partially exposed only along the veins and veinlets. The silvered "pupils" are all that remain of the discal spot and its accompanying spot without the cell. The pink of the under surface is so prevalent that when the butterfly is at rest no other colour is visible, and it looks like a pink blossom. My attention was first called to it by seeing a large *Colias* a few yards in front of me disappear just when I expected to see it at rest on a clover head, as it would fly up at intervals I followed hoping to catch it resting but always puzzled to see it apparently dive head first into the clover. At last, growing impatient, I attempted to "force the fighting," and although I missed my game I so disturbed its flight that I caught a glimpse for the first time of the pink under surface. I was now thoroughly interested and I employed all my arts in vain to decoy or force the wary butterfly into my net. In a few minutes after I had given up the pursuit I caught

in the same field the same butterfly, or more probably, considering the ease with which the capture was made, another similarly coloured, As soon as I had assured myself that the specimen was as pink as I had supposed, I promised myself three or four, remembering that I had seen two within half an hour, but although there were hundreds of *philodice* I saw no more *cæsonia* that day, and more pressing business prevented me from returning to the locality as I had hoped.

ON THE CITATION OF LOCALITIES.

BY T. D. A. COCKERELL, WEST CLIFF, CUSTER CO., COL.

It is the custom nowadays to look down with great contempt on those old authorities, who considered "North America," or even "America," a sufficiently accurate locality to give when describing a species; but, perhaps, we of the present age are not quite blameless of similar and (with our means of obtaining information) less excusable carelessness in, that we often think it enough to give the name of the state or region only. Of late, I have been going carefully through as much of the literature of North American Entomology as I could get a sight of out here in the wilderness, in order to catalogue the recorded Colorado insects for the Colorado Biological Association, and I have been astonished at the number of new species described with the localities given indefinitely, "Colorado," "Texas," and so on. Taking eighty-four species of moths at random, mostly new, and recorded from Colorado of late years, I find only twenty-six have the locality indicated nearer than "Colorado"—and I think this is a very fair sample of the whole. Now, do these describers of species ever stop to consider what "Colorado" may mean? That it may refer to any altitude from below 4,000 to over 14,000 feet, and to anywhere in an area of no less than 103,948 square miles? That "Colorado" may mean snowy peaks, mountain forests or valleys, or level treeless plains, each presenting a distinct fauna of its own? Perhaps they do not stop to consider these points, possibly they do not care, so long as the species has been properly classified and named, and is henceforth recognizable in the cabinet. Well, we cannot all be systematic entomologists, students of geographical distribution, biologists and the rest, but, surely we may be precise in touching on departments not our own, and, if we are giving localities, there is no reason why they should not be sufficiently accurate

and detailed to be useful. It may, perhaps, be answered that most of the species are not collected by the writers themselves, and the collectors sent no exact localities. Probably not, but were they asked for them? Collectors will supply proper localities, and often very interesting details if they are given to understand that these are wanted—as is plainly evident from the fact, that some few careful authors always manage to know where their species come from, and a good deal about them besides.

My own idea in the matter is, that every description of new species ought, if possible, to have the collector's own notes appended thereto, so that we might have some idea of what the *living* insect was like, and not only have an account of its dried remains impaled on a pin. Fancy, if someone undertook to write an account of the human race, founded entirely upon information obtained in the post-mortem room and anatomical museums! But, if we cannot have biological notes, let us at least have localities—they can be got when they are wanted, and indeed, I have known some instances in which names of localities have been duly sent in, but never mentioned by the describing author.

Sometimes authors take it for granted that because they write from a certain place, it will be understood that the species were captured there, but I could easily demonstrate that such an assumption, in all cases in which the locality is not given, would lead us into quite ridiculous errors, and this being so, how are we to discriminate? One usually precise author, who has described a very large number of new species of late years, has given for most of them only the name of the state in which he resides, and for many no locality at all. Now, according to Packard, this state embraces two distinct Zoö-geographical regions, so it becomes of especial importance to know exactly where the insects in question came from. So I wrote to this author, expostulating with him on this point, and he replied that he quite agreed with me that localities should be properly defined, and all the species I alluded to were to be understood to come from the vicinity of the town in which he resided. Now, this is excellent, provided that the lacking or indefinite localities *are* so understood; but on the face of it, until I had this information from the author, this fact was not always evident. Perhaps it has been stated somewhere in his writings; but this hardly betters matters for the student, who naturally takes one paper at a time, and considers it on its own merits, unless referred back to previous remarks bearing upon it.

Fortunately, there are some systematists who do appreciate the value

of precision in localities, and I was pleasantly surprised a short time ago at receiving the following from a well-known naturalist, to whom I had sent a list of mammalia, with their distribution given by counties :—"I hope you keep the exact localities as well as the counties. Most of the counties in Colorado are so large that they include great variations in altitude and physiographic conditions, and hence embrace widely different faunal characteristics." With this quotation I close the subject, commending it to all describers of Colorado and other insects, and drawing their attention to the fact, that after all it expresses the views of all really competent Vertebrate Zoölogists, Conchologists, and Botanists, and hoping that in the future they also will give proper attention to the citation of localities.

One other matter may deserve a passing notice—that of giving credit to collectors. I have nothing to complain of under this head myself, and so can speak more freely. It seems to me, that a systematist who receives specimens from a collector, who, we may assume, has gone to considerable trouble to collect them, and fails to credit him with the captures when describing, does about as discourteous a thing as is possible in Entomological literature. It would be very easy to show that from a scientific point of view, it is always useful to know who collected the specimens in question, and at the risk of being called egotistical, I do not mind saying that I desire and expect that new species I may have collected shall be duly credited to me in publication, and I am sure all other collectors must feel the same. I do not wish to be personal, but very many quite recent cases, in which no collector's name has been given, will occur to everyone*—I need not enumerate them. Some authors seem to think that if they have obtained specimens from professional collectors, they are then, at anyrate, at liberty to omit the collector's name. It seems to me that they are, if anything, under increased obligation to give it. Fancy what an author would say if the editor of a magazine refused to publish his name to an article because he had paid for it! This matter of crediting collectors† is, I think, a serious one, but collectors can easily put it right if they will make a point of only sending specimens to those who will give them credit.

* In some of these cases, however, the authors are probably blameless. It is not always possible to ascertain who was the collector.

† One kind of "crediting," however, I *do* think unwise. If Tompkinson discovers a new insect, I cannot myself see that that is any reason why the poor creature should ever after be burdened with the name "*Tompkinsoni*" !!

LENGTH OF LIFE IN BUTTERFLIES.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

Aurelians are frequently asked how long butterflies live. By this is generally meant what is the length of life of the mature insect. As is generally known, each species passes through one cycle of its existence once a year, though it very frequently happens that two, three, or even more generations succeed one another during a single season, and it has been supposed (though never proven) to be the case with some that two or more years are required for this cycle ; as is known to be true of some other insects. But with regard to the length of life of the butterfly itself, there is not a little variety ; when the disappearance of a given butterfly is in consequence of the approaching cold season it may well be and often is the case that the butterfly has merely gone into winter quarters to appear again on the wing the ensuing spring. In cases like these, the duration of life of a butterfly may be as long as eight or nine months or even more, for there are hibernating butterflies which emerge from the chrysalis by the beginning of August or even in July, but which do not go into winter quarters until September, October or even November, then appear again the next season as soon as advancing spring has begun to make itself felt, and continue upon the wing sometimes through June, sometimes even into July. It is impossible to say certainly whether or not the individuals flying latest in the spring number among them any which were earliest to escape from the chrysalis in the preceding season. But setting aside the chances of capture by their enemies, there is no reason to believe it impossible, and that they may spend and probably in many instances do spend fully ten months of the year in the winged condition.

This conclusion may be reached also in another way. We may add together the ordinary life period of the egg, the time it takes the caterpillar to reach maturity, and the period of the chrysalis, and in these hibernating butterflies we shall rarely find that these stages together occupy on the average more than two months. The remaining ten months must therefore be the average time spent upon the wing, That many may live eleven months or even twelve seems probable, for a butterfly may continue to fly for some time after the first eggs are laid, especially in the case of those which lay but one at a time, where the eggs do not develop in the

ovaries at once, but slowly and by degrees, and so are deposited in succession over a considerable period of time.

In an article in the CAN. ENT. (xiii., 205–214) on this subject, Mr. W. H. Edwards has laboured to show that eggs are almost invariably laid by butterflies fresh from the chrysalis, and that the butterfly dies soon after the laying of the eggs. This proves quite too much, for if it were so, a butterfly would hardly fly more than a week. That eggs are often laid by butterflies soon after eclosion from the chrysalis is doubtless true, but there are quite as many cases where egg laying is delayed for a considerable length of time,—two, three or four weeks; an examination of the ovaries of butterflies will show that it is rarely the case that all the eggs are laid even within two or three days of each other, but that they mature by degrees too slowly for such rapid oviposition. There are of course some, in which the eggs are laid in masses, when a greater number are laid in a single day, but the cases are far more numerous when egg laying is continued over many days, and sometimes probably over several weeks.

It is possible that the duration of the life of butterflies is greater in the north than in the south. As one approaches the tropics, insectivorous birds and other creatures are far more destructive of butterfly life than with us, and the chance of long life upon the wing must be greatly lessened with the numerous liabilities to disaster which overtake the poor butterfly in the warmer regions. There may even be a difference in this respect between districts so near each other as West Virginia and New England. For certainly my own experience of the overlapping of broods of different butterflies as seen by me in New England is very different from that reported by Mr. Edwards in West Virginia, and inasmuch as these broods follow each other with greater rapidity in Virginia than with us, the difference is thereby exaggerated.

To judge from the statistics that I have collected from observations made in the field both by myself and numerous correspondents, I am inclined to think that, in the case of those butterflies which are born and die the same season, the average length of life of the mass of them, that is, omitting mention of those which, cut off early, come to an untimely end, to be not far from four or five weeks, varying in different species from three to six or seven. Of course it is impossible to arrive at any very accurate determination regarding this, since in the case of any particular species we are obliged to base our conclusions on observations of

the times when the earliest butterflies were seen, when they became most abundant, when the numbers perceptibly diminished, or specimens became old and worn, and when the last were seen. It is particularly difficult to decide upon the average age of individuals, when, as is not infrequently the case, a brood of butterflies is augmented by gradual accretions for a long period of time, three, four or five weeks. It is again difficult in the case of those butterflies, and there are not a few of them, like some of our Argynnidi, which appear upon the wing in mid-summer, receive a sudden accession to their numbers a month or two after the advent of the earliest and then only begin to lay their eggs. I, for one, can hardly believe that all these earliest individuals perish before the season for egg laying, and I even think from the condition of specimens, worse and worse as the season progresses, that some of the earliest live to the last and are upon the wing sometimes for two and three months of the year.

ON SPECIFIC NAMES.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Dr. Williston, in his painstaking work on the *Syrphidæ*, says: "There are no generic and specific limitations in nature," and illustrates the statement by the present knowledge of the family with which his synopsis deals. And what Dr. Williston brings forward is a mere quota of the mass of evidence brought out by naturalists generally, and by entomologists dealing with the different orders of insects. But while, theoretically, the essential unity of living forms or of nature as a whole may be granted, the practical question of what names we shall bestow upon our specimens and upon what basis these names shall repose, must be solved. Our systems of nomenclature must be brought into consonance with the facts observed. And it is well that our nomenclature be not too rigorous, so that I have expressed the opinion in these pages that we shall have to use in certain cases a trinomial title. With regard to the test for genera in the moths, I have to refer for my conclusions to a paper in Papilio, 3, 35, where I say that the *amount* and *extent* of the peculiarity gives the criterion, not the *kind*. Every well-marked variation and modification of structure, which can be clearly made out by the microscope or otherwise, is of generic value. The moment this rule is departed from, we are thrown upon individual "opinions." All the characters which, when well-marked, are of generic importance, are liable to slighter modi-

fications, which are only specific. It is the *kind*, *constancy* or *amount* of these modifications which must decide the class in our artificial divisions of these natural objects. And here the tact of the specialist, of which Dr. Williston also speaks, comes into play. With regard to the criterion for species, I have expressed myself already clearly in these pages, so far as the Lepidoptera are concerned. For the student of butterflies and moths, the criterion for species must lie in a knowledge of the whole life of the insect. If it breeds true to type, nowhere encroaching upon the cycle of its neighbour, we must bestow a specific title. The insect is to-day a species, whatever its ancestry, whatever its probable future development. The fact, from our experience, may be assumed without a knowledge of the larva and natural history, but *until* this knowledge is also added to our observations on the perfect insect, the specific title is not firmly or conclusively founded. This is what I meant to say with regard to the forms of *Callimorpha*. Now in separating the forms of *Datana*, we had alcoholic specimens of the larva and the personal observations of Mr. Angus to fall back upon, for most of the species. And the fact with these moths that in the earliest stages the species are not distinguishable on sight, has been shown by Mr. Wm. H. Edwards to be true with nearly related butterflies, as for instance species of Colias. While breeding has revealed to us a number of questions, such as dimorphism, which we must take into consideration, I must still renew my protest against *lumping* upon grounds drawn from the perfect insect alone and upon insufficient evidence. The new facts lead us insensibly to criticize species, to conceive a prejudice against them, and then to lump without sufficient evidence. And I repeat, that as Entomologists we are here to discriminate, to separate, not to confound. Butterflies were by the ancient Hebrews classed among "flying things." From this primitive conception of their place in animated nature, we have gradually come to-day into nearer definitions of their relationship.

In the discussion of all these questions there can be no progress without reasonableness. Temper and even position will not ultimately decide these questions, although the melancholy conclusion of Spinoza is here not without its truth: "unusquisque tantum juris habet, quantum potentia valet." The appeal to time need not always have to be made. A great deal of what is wrong and one-sided need not afflict us, as Entomologists, if we would only take matters coolly, or only grow warm over the beauties of our treasures.

DR. CHRISTIAN ZIMMERMANN.

BY H. A. HAGEN, CAMBRIDGE, MASS.

There exists no biography nor necrology of this excellent entomologist, as far as known to me, though he lived for thirty-nine years in the United States. I am much indebted to Dr. Geo. C. Horn for Zimmermann's note-book, which, with his library, came into the hands of the late Dr. J. L. Leconte.

Only a very short abstract of the contents, which are written wholly in German, can be given. The entries begin with Zimmermann's earliest boyhood and end in 1843, followed by a few pages for 1865. The narrow pages contain only the substances of events in short phrases, often very cutting, both for Europe and for America. If the whole could be published, it would give a very interesting picture of the life of an excellent naturalist, always kept down and hindered by want and ill-luck, but always ready to "begin again." It is sad that such a life, akin to the remarkable histories of former ages published by the masterhand of G. Freytag, should have been possible in the 19th century—a continuous struggle of a noble soul with continuous misfortune.

Christian Zimmermann was born in Quedlinburg, Prussia, September 6, 1800. His father and three generations before him were carpenters, as the name indicates; all were born and died in Quedlinburg. Christian entered the gymnasium in 1811, and graduated in 1821. The note-book, May 26, 1814, says: "I am to-day 5000 days old." (He always counts his life, both in Europe and here, by the 1000 days.) The collection of beetles begins, and the study of music. His talent for music must have been obvious, as one year later he played the organ for the church-service, and studied thorough bass. When he graduated he writes: "Up to this time my money was made by keeping score for target-shooting, teaching children, giving music-lessons, organ-playing, copying music, furnishing music at funerals, stuffing birds."

His parents, who were poor, proposed that he should choose a profession; but determined to study, he went to Halle, where he stayed as student from 1821 to 1825. He passed his examination after having attended the lectures in theology, philology and philosophy, but his entomological studies were never neglected.

In 1827 he published his first music, a Polonaise. When he left Halle in 1828, he was already acquainted with a large number of eminent

zoologists. He went to Berlin, and writes: "Great expectations, small success, a load of cares, experience of the world." He worked with Prof. Klug in the Museum, and gave Latin lessons to barbers' apprentices. March, 1829, working up the genus Amara, of which some sheets were printed. 1830, very bad times begin; want of money. 1831, monograph of the genus Zabrus finished; printed in June.

During this time he had become acquainted with many prominent entomologists and with a large number of students, who later became famous, but the constant want of means was so depressing that he decided to try his fortune as a collector in Mexico. He sold his collection of 2,400 species of beetles and his books. To enable him to fulfil his intentions, twenty-four naturalists of prominence from Germany, England and Russia subscribed six hundred dollars, and a number of friends six hundred and eighty dollars to pay his debts. This was all repaid with interest by Zimmermann, as soon as he had made money here, as a page in his note-book states. He left Hamburg, Aug. 5, 1832, as steerage passenger for Philadelphia. He began directly to collect, and to study the English language. His collection grew rapidly, but in a few months he saw that it was impossible to work in expensive America for cheap Europe without running in debt. So he decided to leave Philadelphia and to try his luck as a teacher in South Carolina. He made the trip, according to the custom of German students, on foot, a knapsack on his shoulders and a few dollars in his pocket. This journey of 713 miles, in the midst of a severe winter, and attended with much hardship, which proves his excellent health and strength, was made in fifty days, with twenty-seven dollars in cash, six dollars credit, three maps, one book and a pocket-knife. The visit to Dr. Melsheimer on this trip has been published before by me. The detailed report of excursion given by Zimmermann to Prof. Burmeister is very interesting, but has never been printed. Zimmermann had no idea that he was here considered simply a tramp, which explains easily and rightly most of his complaints.

In Georgetown, S. C., he tuned pianos and gave music-lessons till he was engaged in the South Carolina Female Institute, at Berhamville, to teach music and drawing. This happy change in his circumstances allowed him to pay directly the debts made in Europe, with five per cent. interest. He collected largely; sometimes quoting the number collected at the end of the month or the year, as: "11,508 specimens have been

collected," besides mentioning any remarkable forms. He made many excursions, visited Cambridge (where he saw Harris), Niagara, Albany, the Catskills, New York and its surroundings. He made the acquaintance of every naturalist of eminence. He sent to Europe many insects and received many from there, together with the newest publications. His correspondence was apparently a large one.

After a few years his situation in the school where he was engaged was given up; it had become unpleasant sometime before. He possessed now an excellent collection, very comfortable furniture and three thousand dollars, and decided to buy a little farm to be used as a nursery and for raising silk-worms. In 1839 he made, as he states, fourteen "farm reisen" in Philadelphia, Maryland and other states, partly with Ziegler and Morris. His project proved to be a failure, and he decided to return to Europe and to send his property to New York. After a short visit to Harris, he went to New York to find that the vessel with all his property was lost in a fearful storm. His note-book says: "Sept. 10, I am notified of the loss of my collection and property." "Sept. 16, beginning of a new collection; the voyage is given up." "Sept. 25, invitation of Harris to come to Cambridge," where he stayed until November 12. On Nov. 7th new insect-boxes were bought of the box-maker, Newell, in Cambridge. He made many excursions with Harris, whose family very well remember the German naturalist.

The next year he lived in Baltimore, occupied with entomological systems and excursions with Mr. Morris, and decided to return to South Carolina. Feb. 27, records a "letter to Hannah, with an offer of marriage." March 21, "Hannah answers 'yes.'" April 3, "I find Horia sanguinipennis." April 14, "I find Trichius maculosus."

He had made the acquaintance of Mrs. Hannah Green, aftewards his wife, seven years ago in Georgetown, S. C. We find in his note-book, "Evening with Hannah; drawings on the wall; Sweet Home and picture; quarrels plenty." Monday, June 21, "Arrival at Rockingham, N. C." June 22, "I reach the town in the morning, visit Hannah at noon, and am married in the evening."

"Hannah begins her school, July 16, with sixteen pupils, and seven pupils of mine in music and drawing."

"Sept. 17, dispute took place with Hannah about American culture,

and the fight that lately happened in Washington among the members of Congress."

It very soon became apparent that it was impossible to make a comfortable living in North Carolina, and they decided to return to Columbia, S. C. Here they built a school-house, forty feet by sixteen, which was inaugurated December 18, 1843. The expense was, for the building, $417 ; for Loring's globes, $33. Income during the year, $1,521; expenses, $1,277.

This is the last entry in the diary, and I know nothing more of his life except what is told in some letters to Thaddeus W. Harris. Some extracts follow: "1865, January 1, I possess $570 in Confederate money ; $200 in Confederate bonds ; $900 in certificates ; $200 in provision store shares ; $13 in bank notes ; $114 in silver. Feb. 10, the Yankees are in Barnwell Co. To-day's prices—A load of oak wood, $140 ; a barrel of flour, $550 ; a pound of brown sugar, $12 ; a bushel of corn, $35. Feb. 17, the Yankees are here, 75,000 strong. This is the last day of Columbia. They at once entered the houses, got drunk and set fire to everything. I began to move everything that could be moved into the garden ; but they broke open the trunks and boxes with their swords, and followed this up with a regular and general plunder. Feb. 22, the Army has left. All quiet. My collection and books brought back in the house. Expenses for this day—1 bushel meal, $40 ; 13 lbs. beef, $22 ; molasses, $6. July 1, we still possess $1,100 Confederate State bonds, worth nothing ; $915 Confederate treasury notes, worth nothing ; $13 South Carolina bank bills, worth — (?) ; $3 South Carolina state bills, worth — (?) ; silver money, $74 ; gold, $2.50 ; copper, 5c. We must begin again at the beginning."

This is the closing sentence. These few, simple words, without any moan over the loss of his all, are not a little touching, all the more so, because the pathos is unintentional—the pathos of facts, not of words. They call to mind his former record of the loss of everything by shipwreck on the 10th September, 1839, followed by the entry on Sept. 16th, "Beginning of a new collection."

Zimmermann died in December, 1867. He left no children.

His interest in science was always kept up. Nearly every month the number of insects collected is reported, sometimes amounting to 3,725, and during the year to 11,500. In November, 1842, he sent fifty dollars to T. W. Harris, to buy three Goliaths. He constantly bought books both in Europe and America, and his library was valuable. It was bought

by the Museum of Harvard College, in Cambridge, excepting some volumes which were retained for his own use by Dr. J. L. Leconte, at whose instance the purchase was made.

His collection is also in the Museum, having been bought first by Dr. Lewis, of Philadephia, and from him by the late R. Crotch, who sold it to the Museum. A great part is in Leconte's collection, and can be recognized at once by the numbers on the pins in Zimmermann's hand-writing.

He was an unwearying worker. In 1842, he wrote to Harris that he was occupied with a systematic arrangement of the Lamellicorns, and wanted Echiurus and Goliath for study. In April, 1844, he writes again to Harris: "I have almost finished my chapter on Lamellicorns."

(To be Continued.)

NOTES FOR COLLECTORS VISITING THE PRAIRIES AND ROCKY MOUNTAINS.

BY GAMBLE GEDDES, TORONTO.

Now that the winter is well advanced and before many weeks are over spring will be upon us, it reminds me of many enquiries made during the last few years about the localities and dates of diurnals captured by me in the North-west in 1883 and 1884. These particulars are nearly all to be found at the National Museum of the Geological Museum at Ottawa, but for the benefit of those who may be visiting the North-west with a view to collecting diurnals, I propose to give such information about the rarest species as my notes supply, and as my limited time will permit.

Beginning with June 10th, 1883, at Brandon, N. W. T., I find *Phyciodes carlota* Reak. was taken, and *Lycœua afra* W. H. Ed.

June 12th, Fort Ellis.—*Erebia epipsodea* Butl. was in beautiful condition.

June 15th, Medicine Hat.—*Colias Scudderii* ♀ and *Colias christina* ♂, *Cœnonympha inornata.*

June 29th.—*C. christina* ♂ plentiful, *C. Astræa* ♀ (?) one specimen or two.

June 30th, Calgary.—*Chionobas varuna*, *Satyrus* var. *boopis*, *Lycœna afra*, *L. anna*, *L. amyntula*, *L. rustica*, *L. sœpiolus*, *C. ochracea* and *inornata;* of Colias four varieties, viz.: *C. Edwardsii*, *C. Scudderii*,

C. alexandra and *C. christina; Anthocharis olympia*, *A. ausonides*, about the swamps; *Argynnis nevadensis*, *A. artonis*, *A. Edwardsii*, *A. bellona; Phyciodes carlota*, *P. tharos; Chrysophanus epixanthe*, *C. helloides*, *Pamphila Manitoba*, *Zabulon*, *Cernes*, *Manataaqua*. Not a bad day's work for the last day of June.

July 8th, Edmonton.—*Arg. lais* and *cybele*, *Lim. arthemis*, *L. disippus*, *Lyc. anna*. No Colias or Pieris seen to-day.

July 23rd, Fort Macleod.—*Arg. leto* ♀ and *Chrys. sirius*.

July 25th to 30th, Pincher Creek.—*Arg. clio* and *eurynome* taken; *Arg. artonis; Pieris occidentalis*.

July 30th.—First specimens of *Parnassius smiutheus*, *Chrysophanus Florus*, *Col. Scudderii* ♀ pale green. Several taken.

Aug. 1st.—*Thecla mopsus*, *T. titus*.

Aug. 2nd, Garnett Ranche, mouth of Crow Nest Pass.—*Colias Hagenii*.

Aug. 3rd.—*Par. smiutheus*. Very common, both sexes.

Aug. 5th.—*Satyrus charon*, and *Sat. sylvestris*, and *Arg. leto*.

Aug. 6th.—*Arg. boisduvallii*, *Limenitis lorquinii*, *Chrys. mariposa*, *Mel. pallas*, *Mel. nubigena*.

Aug. 8th.—*Arg. monticola*, *Pieris oleracea*.

Aug. 15th, Belly River.—*Col. Hagenii*; dwarfed in size, and every shade from albino to orange.

In 1884 I started much later, leaving Toronto 26th June.

June 30th.—Saw one ♀ *Colias christina*, first day out west from Winnipeg.

July 1st, Swift Current.—*Chysophanus dione*, *Arg. Edwardsii*, *A. Nevadensis*, *Euptoieta claudia*.

July 3rd to 7th, Calgary.—*Col. christina*, *A. lais*, *A. Nevadensis*, *A. artonis*, *Thymelicus hylax*.

July 10th, Morley (now Canmore) station, C. P. R.—*Lycæna shasta*, *Arg. monticola*.

Aug. 1st, Laggan.—*Anthocharis hyantis* and *ausonides*, *Chrys. mariposa*, *Chion chryxus*, *Colias elis*. This was a grand point for collecting. Emerald Lake, about 4 miles from here, is a lovely spot, and the vegetation plentiful and varied, with large numbers of insects.

I have curtailed this as much as possible, but I shall be glad to correspond with anyone going to collect this season, with a certain feeling that, if the eggs of *Colias elis* can be obtained, we shall have the mystery cleared up about the ♂ of this beautiful fly.

AGAIN RILEYA.

BY L. O. HOWARD, WASHINGTON, D. C.

If all controversial writings were as happy as Mr. Ashmead's last, readers of the CANADIAN ENTOMOLOGIST would not regret the space occupied, and I am glad that one side of the controversy is interesting reading. I hope I may be allowed space to say that Mr. Ashmead admits in conversation that he has erred in his statement that my first publication of the description of Rileya was in the CANADIAN ENTOMOLOGIST for Oct., 1888, as I have shown him the last page of *Entomologica Americana* for July, 1888. May I also state dates once more? Mr. Ashmead's first mention of Rileya was published in his synoptic table in *Entom. Am.* for June, 1888. My full description was then in the hands of Mr. Smith, and was published in *Entom. Am.* for July, 1888. Mr. Ashmead's full description appeared in the Kansas Agric. Exper. Station Bull., in July, nine days later than mine. Entomologists following Mr. Ashmead's views are perfectly at liberty to use the excellent generic name he has proposed for my Rileya, while for the use of those who adopt my views, (and I am happy to say that several well-known entomologists have expressed themselves in my favour), I venture to propose for the Eurytomid genus which was called Rileya, the appropriate generic name *Ashmeadia*, as indicating my appreciation of Mr. Ashmead's unflagging industry as an entomological worker.

CORRESPONDENCE.

COLIAS CHIONE, CURTIS.

Dear Sir: It may be of interest to some of our readers, who are interested in the genus Colias, to know that Mr. F. Fitz Payne, (who accompanied Lieut. Gordon's expedition on the "Alert" to the Arctic regions), brought back amongst his collection a single specimen of a most peculiar green coloured female Colias. It was sent to Mr. W. H. Edwards first, who examined it, but did not pronounce decidedly upon its name. A few weeks ago Mr. Henry Edwards was spending an afternoon with me, not long after his visit to the British Museum, and he assures me I have got the ♀ of *Colias Chione*, Curtis. The only other specimen known being in the British Museum. I observe that Mr.

Kirby has placed this in his catalogue of Diurnal Lepidoptera as variety "A" of C. *Boothii* Curtis, and both *Boothii* and *Chione* were taken in Ross's 2nd voyage, and both the species and variety were described by Curtis, in 1835. It would be a curious coincidence if, after an interval of over half a century this turned out to be a good species. I have written to a friend, who constantly visits the British Museum, for full particulars and description of the specimen in the collection there, and will state his views through the medium of the CANADIAN ENTOMOLOGIST in a future number. GAMBLE GEDDES, Toronto.

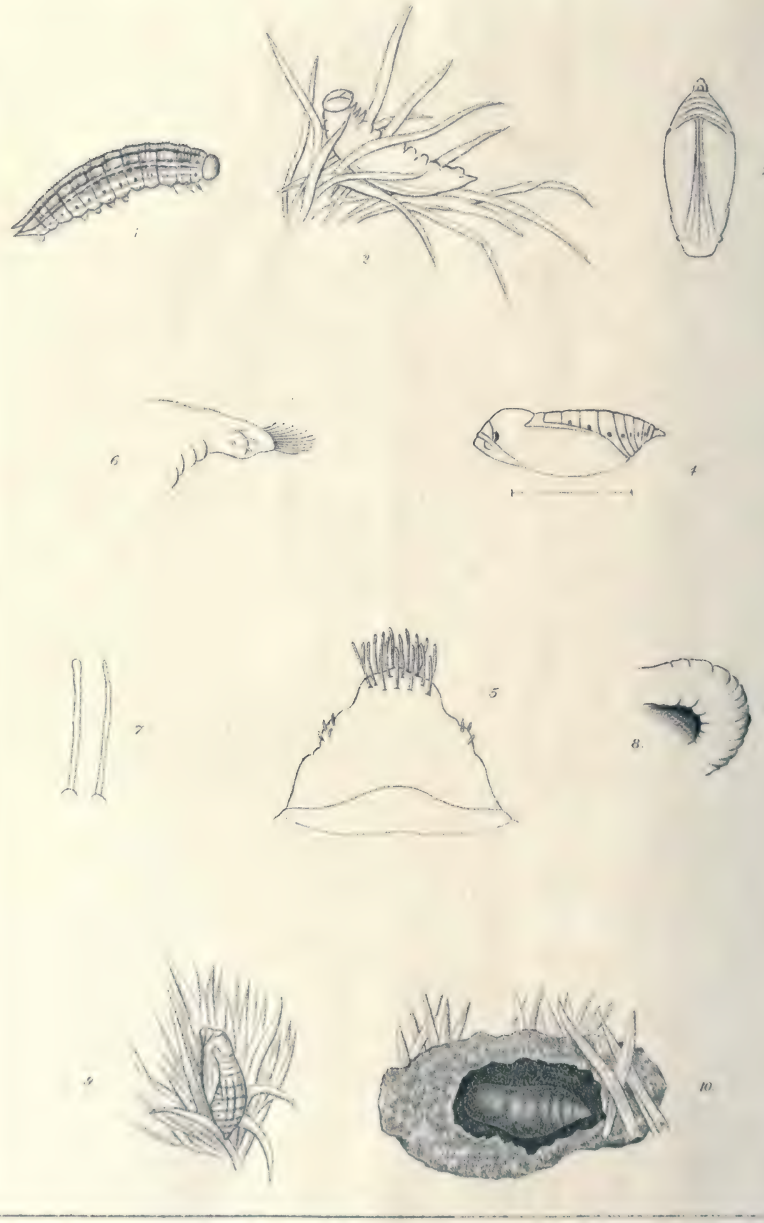
ARCTIA PHYLLIRA, DRURY.

Dear Sir: When I was in London a year ago, working on the Society's collection, I found amongst the Arctians one that clearly did not belong to any of the forms represented therein; it had the label of A. P. Saunders attached, bearing date July 6th, 1886. Being unknown to me I labelled it "undetermined," and laid it aside; recently, however, when turning over some of the books in the splendid library of the Society, I found the unnamed Arctian unmistakably represented on plate lxiv, vol. 2 of Smith & Abbot, and named *Phalæna phyllira;* also in Westwood's Drury, vol. 1, plate vii, fig. 2. It is quite an attractive form, and new to the Canadian list. Mr. H. S. Saunders also has a specimen, taken at electric light, Sep. 6th, 1887. J. ALSTON MOFFAT.

NOTE.

Later on there will certainly be more to be said respecting certain points touched upon by me in the CAN. ENT. for 1888, but there are four things it will be useful to refer to now. Since writing on *Nathalis iole* (p. 156) I have found that there exists a form of the ♂ in which the "orange spot" is yellow during life. With regard to the forms of *Colias eurytheme* in this locality (p. 201), I now find there is a short flight of genuine *eriphyle* here in September, but the specimens are not so extreme in their divergence from *autumnalis* as one Mr. W. H. Edwards sent me (locality not stated). I shall have more to say about all these forms of *eurytheme* later on. The yellow spider on pink flowers (p. 176) and the Asilid fly attacking *C. eurytheme* (p. 202) have been kindly examined by Dr. C. V. Riley and pronounced to be species of *Misumena* and *Stenopogon*. T. D. A. COCKERELL, West Cliff, Col.

Mailed March 7th.



The Canadian Entomologist.

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DESCRIPTION OF THE PREPARATORY STAGES OF ARGE GALATHEA, LINN., WITH NOTES ON CERTAIN SATYRINÆ.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG. — Sub-ovoid, broadest on lower third, the base flattened; covered with a very slight rhomboidal network over the upper third, with low knobs at the angles; on the middle the network is still more slight, but the knobs are distinct, and on the lower third the knobs are minute and unconnected by lines; summit flattened, concave; the micropyle in centre of very fine network without knobs; colour bone-white. Duration of this stage about 20 days.

YOUNG LARVA.—Length, at 12 hours from the egg, .1 inch; thickest anteriorly, tapering to 13, which ends in two short sub-conical tails; colour yellow, with a tint of red; the tubercles arranged as in Erebia, forming three longitudinal rows on either side; these are small, conical, each with a long curved whitish hair; feet, legs and under side same colour as upper surface; head sub-globose, broader than 2, granulated, with a few whitish points and long hairs; colour brownish-yellow. The larvæ hibernated from the egg.

After First Moult.—Length at 12 hours, .18 inch; colour yellow-buff; a narrow pinkish mid-dorsal stripe, a sub-dorsal same width, then as much of buff on side, and a broad pinkish stripe to the basal ridge, which is yellowish; under side, feet and legs, yellow-brown; body covered with a downy coat of yellowish hairs from fine points, and among them on each segment are black hairs from larger and darker tubercles; head sub-globose, yellow-brown, with yellow and black hairs like those of body. Duration of this stage 11 days.

After Second Moult.—Length .3 inch; stout; yellow-buff; a darker mid-dorsal stripe, and a similar broad lateral band; the basal ridge paler than the ground; under side greenish-buff; thickly covered with buff hairs; head green-buff. Duration of this stage 10 days.

After Third Moult.—Length .65 inch. At nine days from this moult was full grown.

Mature Larva.—Length 1.1 inch; stout; thickest at 4 and 5, tapering rapidly to 13, and ending in two short sub conical tails; colour buff the dorsal area of a yellow tint, the sides reddish; the under side a green tint up to the red-buff; feet and legs same; a brown mid-dorsal stripe; on side the band a shade darker than the ground; the basal ridge lighter, or yellowish; body thickly covered with rather stiff, long hairs; head small, sub-globose, a little depressed at top; colour greenish-buff, with many buff tubercles and hairs both long and short. (Fig. 1.)

Soon after, the colours became paler, the bands faded, and the larva was lethargic, eating nothing, but lying at the top of the sod curved like a figure 6. At 18 days from third moult pupated in the grass, unattached.

Chrysalis.—Length .54 inch; breadth at mesonotum .18 inch, across abdomen .24 inch; abdomen remarkably stout (one-third broader than the anterior segments), conical, but irregularly so, the ventral side and the whole body up to thoracic segments being greatly swollen, while on dorsum the curve is slight, and rises no higher than does the mesonotum; this last is very low, rounded both ways; the head case short, rounded at end, rounded transversely and at the corners; at each shoulder, over the thoracic spiracle, a black-brown, corrugated shell-like process standing out obliquely and quite prominent, in the middle sometimes a little separated from the surface of the body; cremaster short, bluntly pointed, on dorsal side having same curve with abdomen, on ventral side excavated, with the edges thickened, horse-shoe shaped, and having at the end a brush of short, stiff bristles, straight, not the least hooked. (Figs. 3, 4, 5 to 8.) Duration of this stage 14 days.

This pupa is very like that of Eudamus *Tityrus* and *Lycidas;* the same dorsal and ventral outlines, same slope from mesonotum to top of head, same form of head case; and the thoracic spiracle protector (Fig. 8), as Mr. Scudder calls it, is similar in both; in *Galathea* this process is more curved and shell-like, and a little more projected from the surface, but they are essentially of same character.

Galathea flies in Europe and Algeria, according to Kirby. It is prettily checkered in black and white, has a slender body, and large wings in proportion, as in most of the family. It has no near ally in North

America. Kirby places its genus, which he calls Melanargia, next to what he calls Œneis, Hübner, but which should read Chionobas, Boisduval.*

The imago and two varieties of the larvæ are figured in Humphrey and Westwood's Brit. But., and what purports to be the pupa, suspended by the tail from a leaf of grass. There is no resemblance at all between the pupa so figured and the true pupa. The description of the larva is limited to one line, "yellow-green, with a dark line down the back and on each side."

In Buckler's "Larvæ of British Butterflies and Moths," 1886, (a book which every working Lepidopterist ought to own, and published at a very low price, to wit: ten dollars for the two volumes so far issued, the first one covering the Rhopalocera); on plate iii. is figured the adult larva of *Galathea* and the pupa. I have had this larva copied on my plate, Fig. 1. The text, which is by Rev. J. Hellins, represents the pupa as found on the sod, and unattached by the tail. This figure suggests an affinity to certain moths, noctuids especially,† and led me to wish to breed the species from the egg. M. Paul Chrétien, of Paris, kindly obtained eggs and sent them in a quill, in letter. They reached me 3rd Aug., 1886, thirteen days out, and hatched the next day. The larva, when about to come forth, cut the top in a circle, but not completely around, and raising this trap door made its way out, the door immediately falling back. The egg looked almost uninjured. The larva did not eat the egg shell. I mention this, because Mr. Hellins says the young larva "eats up its egg shell almost entirely," and he adds, "and thenceforward feeds on grasses," also, "it hybernates when very small." My larvæ hybernated at once from the egg, just as the larva of Satyrus *Alope* does. I put the little animals in the cellar, and later sent them to Clifton Springs, N. Y., to go in the refrigerating house there. They came back 21st March, 1887, in good condition. On 12th April, one passed the first moult. This larva

* There is no such genus properly as Œneis, Hübner. There is a coitus of that name in Hübner's Verzeichniss, made up of mixed Chionobas and Hipparchia, and another one also made of the same two genera. By calling a coitus a genus, which it is not and was not intended to be, eliminating the Hipparchias from both these coitus, dovetailing together what remains, and calling the manufacture Œneis, with a label Hübner, 1816, we get what is called the genus. The makers of lists and catalogues about 1870 hit on this contrivance, and many European authors have come to adopt the name Œneis. In this country it has not met so favourable a reception. Perhaps the first definition of the genus Œneis (and a definition is indispensable to recognition) was given by Mr. Scudder, in Syst. Rev., 1872; but Chionobas, Boisduval, 1832, has the priority.

† This figure resembles the larva of Agrotis, all but the terminal segment, which is Bombycid.

passed the second moult 23rd April, the third 4th May, and pupated 22nd May. I succeeded in getting but the one larva to pupation, and having accidentally injured the surface of the pupa, I put it in alcohol. The next year, M. Chrétien sent more eggs in same way. They hatched, and the larvæ went at once into lethargy, as before. They came back from New York, 6th April, 1888. I recorded that one was about to pass its first moult on 20th April, that two were at same time about to pass second, and two had already passed second on 5th June ; that the appearance and attitudes of these larvæ are very much like noctuid larvæ. They are obese, sluggish, and spend most of the time lying on their backs or sides on the surface of the sod, the head and next segments bent in ; or else they lie in a complete ring, the tail and head meeting. If resting on a stem of grass, the body is supported by the pro-legs only, the anterior segments arched, the feet not touching the stem. Now and then I found one feeding, but they did this mostly at night. On 13th June, one larva was evidently near pupation, by the pale hue of the skin and the disappearance of the lines. I record that it lies on its side and back between two stems, wedged in, its feet in the air. Next day it had got away from the stems and was lying on its back, much doubled up (Fig. 2). The following day it had pupated just where I had last seen it, unattached by the tail.

By 17th, I noticed that a second larva had fixed itself as I had recently seen one of Erebia *Epipsodea* do when about to pupate. It was nearly an inch clear of and above the sod, had drawn a few leaves of grass together by a few threads and rested among them upright, holding to the edge of a leaf by the prolegs, the dorsum much bent and turned to the left. An hour later the larva had loosed its hold and slid down, and was sticking upright in the sod, but had reversed its position, the dorsum now facing to the right. There it pupated, upright.

On 18th, another larva was lying on its back, like the first one mentioned. I had had a long search for it, and feared it had escaped, but by clipping the grass stem by stem, it was found low down in the sod, and there it pupated, 20th. The fourth also pupated, but among the roots, and was found only by pulling the sod in pieces. The fifth pupated in the night of 4th and 5th July. It had fallen off the bag which covered the plant, and was lying motionless on the earth. I laid it on its side among the leaves, and there it pupated, spinning no thread. From these pupæ I got five butterflies, the first one on 28th June, the last in middle of July.

Buckler figures what is called the third moult, and again the fourth moult. But, as I have said, my larvæ, in both years, passed three moults only. From the size of the figures I should say that both represented the same stage, one just after third moult, the other at maturity. Nothing is said of moults in the text. The young larva is described, then at length of 2.5 mm., and the mature larva at 30 mm. Mr. Hellins agrees with Westwood that the colour is variable, being buff, but sometimes green. All my larvæ were buff. It is stated that the larva "becomes full fed in June, and changes to pupa without suspending itself in any way, or making a cocoon," and the author adds, "I think it" (in natural state) "would hide itself, as my example did. I found they had got among the thick moss with which I had furnished the bottom of their cage, and apparently made little hollows for themselves by turning round." The pupa is described at length, but the curious "thoracic spiracle protector" is passed over so slightly that one would not suspect the nature or form of it, merely saying, "the pair of spiracles at the shoulders large and dark brown." *

The pupa which I had in 1887 was sent to Mr. Scudder, with no intimation of the species or its history, and he was asked what he thought it might be. His reply was: "The pupa you send seems very like one of the larger skippers, but I do not see any enlargement of the antennal tips, and think it must be a moth. The 'ear-like' projections are the thoracic spiracle protectors, which are entirely like this in *Tityrus*." As before said, Eudamus *Lycidas* pupa has the same sort of process.

I bred Erebia *Epipsodea* to imago in 1888, and found that here also the pupa was unattached. The end of the cremaster has a few short, straight bristles, both fewer and shorter than those of *Galathea*. Mr. Fyles bred *C. jutta*, and it pupated down in the moss, unattached. Mr. Scudder has described the mode of pupating of *C. semidea*, also down in the moss or among rocks, unattached, and neither of these have any bristles at all on the cremaster. This species is also described as curling up in a ring. *C. chryxus*, which I bred to pupa last year, is without bristles. It behaved like *Galathea*, pupating in the sod. Buckler figures

* The accompanying plate shows the larva of *Galathea*, Fig. 1, copied from Buckler; Fig. 2 shows the attitude on the sod when near pupation; 3 and 4, the pupa; 5 and 6, the last segment and cremaster, dorsal and side view, with the group of terminal bristles; 7, the single bristle; 8, the thoracic spiracle protector.

Erebia *Blandina* as pupating upright in the sod, also unattached; and I have copied this pupa on the plate, 9.

More remarkable still is Buckler's figure of Hipparchia *Semele* pupa (iv). It looks like *Tityrus* also, but is stouter, and the ventral side protrudes as in that species and *Galathea* (Fig. 10). Mr. Buckler's own account accompanies the plate. He dug the larva out of the sandy ground near the sea shore. "The captured larva, on being placed under a glass on a pot with its native food, immediately burrowed in the sandy earth, and the few times it was seen on the grass were always at night. On the 23rd June I searched for the pupa and found it in a hollow space a quarter of an inch below the surface, the particles of sand and earth slightly cohering together, and close to the roots of the grass, yet free from them. The pupa was obtuse, rounded, turned and smooth, and wholly of a deep mahogany colour." That is a strange recital! An Arctic Chionobas may be compelled by the severity of the climate to live within the moss and pupate there, but here is a species in the temperate regions, at the level of the sea, burrowing in the sand like a cut-worm, coming out at night to feed and returning to ground cut-worm fashion, and pupating under the surface in a manner common to many families of the Heterocera, even certain genera of Sphingidæ.* Probably many other species and genera of Satyrinæ have larval habits such as I have related. Of the vast number of species but few are known in the early stages. Mr. Scudder says, p. 119: "We know of at least eight European species (besides *Galathea*), mostly referred to Satyrus, but some to Epinephele and Pararge as well, the chrysalids of which are not suspended."

We have in America a butterfly, *Ridingsii*, provisionally placed in the genus Hipparchia, but which is not congeneric with *Semele*, the larva and pupa of which may have the form and habits of *Galathea* or even of *Semele*. I have its larvæ now hibernating.

The Satyrinæ are a very numerous family, with many natural genera, and most of these have numerous species. Kirby, in 1871, made 80 genera, and as many species have been described since, and of making of genera, natural and artificial, there is no end, I dare say there are 150 genera of some sort in the books to day. The butterflies are all or nearly

* "AGROTIS C. NIGRUM feeds by night on the tops of red clover, hides in the ground by day, pupates in a loose cocoon on top of the ground beneath rubbish, or even without any cocoon; but most Agrotids pupate in the ground. All the larvæ of the genus have the habit of curling up."—*French*. I sent Prof. French one of these plates. He writes:—"No. 10 is precisely as I have seen the Agrotis pupate."

all feeble-bodied, feeble-winged, of weak and intermittent flight, and frequent woods and grassy spaces, loving the shade. "Distinguished by their peculiar flight, which is of a feeble, wavering, dancing character, and not long sustained; neither do the insects rise far above the ground. Wallace, in writing of the species found on the Amazons, says he does not 'remember to have ever seen any species rise four feet from the earth, while the greater part of them *do not exceed as many inches.*' Some genera of the allied Morphinæ are said by Wallace to be 'truly crepuscular, never flying by day except when disturbed. * * * They remain hid during the day in the gloomiest shades of the forest.'"—Scudder.

As before set forth, here are four genera, Arge, Hipparchia, Chionobas and Erebia, in which the preparatory stages of species resemble in habits and form the Hesperidæ and certain moths. The last two are Arctic or boreal. The American Erebias, *Epipsodea* and *Magdalena*—this last represented on the shore of the Arctic Sea by *Fasciata*, (see But. N. A, vol. iii, pt. vii for this,) the two evidently being forms of one species—fly at the extreme north, or on the summits of the loftiest peaks of the Rocky Mountains. Chionobas *Semidea* also flies within the Arctic circle, as far north as Cumberland Island, and in Labrador, but there are isolated colonies at two other points, namely, the summit of the White Mountains of New Hampshire, and the high peaks of the Rocky Mountains. *C. jutta* is boreal, being found in Labrador; but it reaches farther to the south than any other of its genus—to Quebec, Ottawa, and Bangor, Maine, where it flies at low elevations. Arge and Hipparchia are found inhabiting the temperate parts of Europe, and the first of these even crosses into Northern Africa. Erebia *Magdalena* and Chionobas *Semidea* live under the severest conditions. Mr. David Bruce says of *Magdalena* and its habitat: "It is found in the most uninviting looking spots it is possible for a naturalist to explore—black, barren, detached rocks, that look as if an immense peak had fallen and split into fragments; hardly a blade of grass or a patch of lichen to relieve the utter desolation. I have never found this species but among such broken rocks, varying from 12,000 to 14,000 feet elevation. The sun gleams out, and awakened into activity by its beams, comes *Magdalena*, flitting leisurely, then suddenly taking an upward flight, it soars around. Another of same species springs up from the rocks, the usual skirmishing chase ensues for a few minutes, the sun is again obscured, and the insects disappear as if by

magic, and will not be seen until it is bright again. I have met with it from June 28th to July 18th." As Mr. Bruce searched for two seasons for this particular and exceedingly rare butterfly. this period of 20 days in in which he found it, may be taken for the duration of the species in its imago stage. It is not probable that the life of one of the individual butterflies lasts one week. All butterflies die speedily after copulation (♂) and laying of eggs (♀), even in temperate regions. Many species in the same regions come from pupa with eggs mature, and copulation takes place almost at once, often before the wings of the female are dry, and in one well-known case, *H. Charitonia*, often before the imago is out of the pupa shell. We may be sure that nature would allow of no loss of time at 13,000 elevation. The existence of the species must depend on getting the eggs laid and protected. Mr. Bruce is of the opinion that there is an annual brood of the imago. I myself had thought there could be but one every two years, from my experience with allied larvæ, which are excessively slow in growth My imagos of *Galathea*, as stated, showed 17 days between the emerging of the first and the last from pupa, and yet they were all hatched on same day. The 20 days spoken of by Mr. Bruce, as said above, represents the time in which the species was alive in the imago, not the life of one individual by any means. Spending therefore 51 weeks out of 52 in, or on, or under the ground as egg, larva, or pupa, one week in the imago, hiding among the rocks whenever the sun is obscured, and it is often obscured, or when fierce winds blow, and there must be very little time when a stiff breeze or a tempest is not blowing, the temperature every night, as Mr. Bruce tells us, as low as 30° Far., at the least, ice forming wherever there is a bit of water—is it possible to conceive an existence more unsuited for a creature dependent on sunshine than this *Magdalena* lives, imprisoned on those summits? Yet, the species must have lived so through untold ages.

For the history of *Semidea*, in New Hampshire, I will quote from Mr. Scudder, in his grand work, the Butt. N. E., pages 589 et seq: "These two butterflies (Argynnis *Montinus* and Chionobas *Semidea*) may be looked upon as the oldest inhabitants of New England, which followed the retreating ice sheet in its progress northward. They were the first of their tribe to fly over the barren fields of New England, where the earliest verdure began to follow the withdrawing ice, and moving with it, step by step, were at last, some of them, beguiled by the local glaciers in the

White Mountain region, long after the main glacial sheet had left these mountains far in its rear, and until connection with the main body was finally cut off." And quoting Mr. Grote on this species and its ancient history: "They advanced behind the deceiving local glaciers, step by step, up the mountain side, pushed up from below by the warm climate, which to them was uncongenial, until they reached the mountain peak. Here, blown sidewise by the winds, they patiently cling to the rocks; or in clear weather, on weak and careful wing, they fly from stemless mountain-pink to blue-berry. Drawn into the currents of air that sweep down the mountain-side, they are forced downwards to be parched in the hot valleys below." Mr. Scudder continues: "It will be asked how it is possible that such delicate organisms as butterflies can maintain themselves *in such a bleak and inhospitable region* as the summit of the White Mountains, where a Greenlander would find it impossible to live in comfort, inasmuch as he would be exposed not merely to the cold, to which he is no stranger, but to the *fiercest and most biting winds, with an amount of humidity accompanying them which would seem to be almost fatal to existence.*" The author then speaks of the long larval period, during which the species is protected among the rocks and snow. Then continuing with the imago, it "invariably closes its wings back to back, and settles upon one side as if reclining, the *point of the wings away from the wind*, where it clings to the roughnesses of the rocks, and is seldom blown from its foot-hold. * * * In the imago state, *it cannot bear transportation so much as 3,000 feet vertically* to the base of the steeper slopes, at least if this transportation is effected in a rapid manner. *Indeed their efforts at flight under such circumstances are so pitiable* that it would seem very doubtful if the butterfly hurled deep down into the ravines by the fierce blasts which may at times catch it unawares could possibly remount the steep slopes. That such cases of destruction may occur with so feebled-winged a butterfly seems by no means impossible," etc.—the author relating how he had seen these insects swept over the cliff, etc. On page 145, we read also: "They can offer no resistance to the winds, and whenever they ascend more than their accustomed two or three feet above the surface of the ground * * * they are whirled headlong to immense distances," etc. He then relates how this butterfly escapes capture, "by edging its way afoot to the brink of a crevice," and dropping into same. And that he took three healthy females down the mountain on the railway train, and before half the descent was made they

were visibly affected, and by the time the tree line was reached—elevation 4,500 feet—they were gasping for air. At 2,800 feet, where he was staying, he thought them dead, and finally killed them, as they "gained no strength at the end of twelve hours." Doubtless similar careful observations and experiments with *Magdalena* would reveal a similar history. Mr. Scudder, p. 144, thinks it probable that the larval stages cover two winters. If so, the imago is biennial, as *C. Bore* of Europe, is said to be: "*Bore* hibernates twice as caterpillar and changes to chrysalis in May, in the winter quarters of the larva, free, in sand, between roots of grass under the surface of the ground."—But. N. E., p. 126. That is, another species of this genus has the larval habits of a noctuid moth.*

The existence of *Magdalena* seemed as bad as bad could be, but these accounts of *Semidea* indicate a worse climate and therefore severer trials. These are two of the feeblest butterflies in the N. Am. fauna, and this sort of existence has endured at least since the glaciers retreated, and no one can guess how many years longer.† When we read that butterflies have come down from the Tertiary period unchanged, we may allow for *Semidea* a vast antiquity.

Members of the *Semidea* species dwell to-day within the Arctic circle, in Labrador, in the White Mountains of New Hampshire, and in the Rocky Mountains in Colorado, separated by vast distances. Mr. Scudder shows that the mountain colonies cannot exist in the low grounds, cannot even

* The history of *Semidea*, as related by Mr. Scudder, mostly from his personal observations, is worth the price of the whole work; and I recommend every person interested in butterflies to make it a part of their library without delay. I differ with Mr. Scudder radically about many things, the restriction of genera, the resurrection of obsolete names, the use of Hübner's Coitus and Tentamen names for genera and families, but in other important and essential points this work of his is and will forever remain unapproachable. The wealth of illustration is amazing, not only of the butterflies themselves, but of every part and organ of them, and what has never been attempted before except on a limited scale, the eggs and young larvæ are shown in greatly magnified and admirably executed figures. In any future system the eggs and young larvæ will form an important part. The time is coming when classification based on features of the imago alone will be thrown over, and the new arrangement will take consideration of all three of the preparatory stages. For these matters and the anatomical details, worked out with wonderful ability, and the life histories and distribution worked out with exceeding care, the Butterflies of New England will be a standard work, and no student can possibly get along without it. The edition is limited and the plates cannot be reproduced; therefore, I say to my friends, subscribe without delay.

† Mr. Geikie, in the Great Ice Age, p. 135, is of the belief that the last glacial period terminated 80,000 years ago, and began about 240,000 years ago.

descend the peaks; therefore there cannot have been communication between these branches since the retreating ice stranded the two southern colonies. Yet they are not distinguishable from one another. Examples from Labrador, even also from Ungava Bay, lat. 59°, are precisely like examples from the White Mountains and Colorado, and in fact these three branches of the species are not known to differ by a scale or a hair.

(To be continued.)

DR. CHRISTIAN ZIMMERMANN.

BY H. A. HAGEN, CAMBRIDGE, MASS.

(Continued from page 57.)

The following is a list of the entomological works of Dr. C. Zimmermann :—

1. Monographie der Carabiden, Erstes Stueck, Berlin and Halle, 1831, 8vo., pp. 8 and 76, contains the family Zabroides, five genera, with twenty-six species; review in Oken Isis, 1832, vol v., p. 539, vol. x, p. 1117; extracted in Silbermann Revue, 1833, T. I., p. 45-47. The author's copy belongs to the library of the museum.

2. Monographia Amaroidum.—The work was interrupted by the author's voyage to America. The library of the museum possesses out of Zimmermann's own library a few sheets, printed in Europe in 1831, in two parts (proof sheets). The work is written in Latin. First part, p. 1-48 (three sheets), the general description of the family Amaroides:—I. de capitis partibus, p. 5 (os, instrumenta masticandi); II. de trunci structura, p. 16 (collum, pectus, pedes, alae); III. de abdomenis segmentis, p. 31 (dorsum, venter, appendices); general division of the Adephaga and Carabidæ, p. 36, in 12 stirpes; de corporis partibus externis, p. 40, the plate (table 1) is not present, probably never printed, then follows the general description, p. 44, which gives the characteres sexuales (not finished), p. 48.

The second part (also not finished), Monographia Amaroidum, quotes the first part as:—Dispositio methodica nova Coleopterorum Adepha-

gorum. The characters of the family (p. 1) are followed by the systema of the family in twelve genera (p. 11).

1. Leirus Megerle, p. 12, twelve species, four new.

2. Lioscelis, Zimm., p. 31, nine species, two new (not yet finished). The third sheet is by error marked the fourth, and the pagination, p. 49-60, is wrong, instead of p. 33-48.

I have given purposely a detailed account of the two papers, only known by proof sheets, out of Zimmermann's library, as they contain, indeed, the most elaborate account of the general characters of the family. The description of the genera and of the species, as far as contained in the papers, is very detailed.

The paper on Amara is quoted in my Bibliotheca II., p. 304, No. 2. It is in some way different from the Latin paper just described. It is published in German and translated in French, also the papers Nos. 3, 4 and 5. Besides those papers, after his death Dr. J. L. LeConte has published the two well known in the Tr. Ent. Soc., Phila., 1868, on Scolytidæ, and in 1869, synonymical notes on Coleoptera. Dr. J. L. LeConte's Scolytidæ, p. 149, says:—"Among the MSS. of my deceased friend, Zimmermann, I find several partially completed memoirs, which contain not only systematic ideas of much value, but descriptions of many new species belonging to our fauna." Nevertheless he has published nothing more of them, and I am informed by Dr. J. H. Horn that nothing more of Zimmermann's papers was found after Dr. J. L. LeConte's death.

The following report is given in a letter from Zimmermann to Th. W. Harris, July 4, 1853 (in the library of Boston N. His. Soc.), it must not be forgotten that the letter was written before Chapnis and Candeze appeared:—

What I have observed about the beetles, grubs and their use for a methodical synopsis I will subscribe here with a few words only, for the thermometer rises again about 100°.

COLEOPTERA.

A. Larvæ of 13 segments, full of folds, never with eyes.

1. Petalocera (= Lamellicornia), forming three sub-divisions, *(a)* containing *Oryctes*, *Melolontha*, *Copris*; *(b)* containing *Trox*, etc.; *(c)* containing *Lucanus*, etc.

2. Rhynchophora, *(a)* containing *Hylurgus; (b)* containing *Curculio; (c)* containing *Brenthus.*

B. Larvæ of 13 to 14 segments (head and prolegs included, each for one segment), without folds, with or without eyes.

3. Tetramera, *(a)* containing *Capricornia; (b)* containing *Bruchidæ; (c)* containing *Phytophaga.*

4. Pentamera, *(a)* containing *Sternoxa*, (a) *Buprestidæ*, (b) *Elateridæ*, (c) *Cebrionidæ; (b)* containing *Cleridæ; (c)* containing *Lycidæ.*

5. Heteromera.

C. Larvæ of 13 to 14 segments (mostly 14), above scaly, swift footed, always with eyes.

6. Adephaga.

7. Rhypophaga.

8. Brachelytra.

I have directed all my powers upon the investigation of the larvæ. Up to this day, however, I did not discover any more or better distinctive characters than those given above, and which appear to contain all the external characters worthy to be trusted, for you know already that numbers of them change their dress and form with each moulting. I may remind you here of the curious transformations of the larvæ of *Meloe*, as investigated in the Linnean Transactions, vol. xx. These little creatures appear as frequently delineated, at first with long legs for swift running, which is necessary for them in order to reach their final abode; having accomplished that they become by degrees fatter and more sluggish, whereby, curiously enough, the length of their legs decreases. The apparent difference between the larvæ of *Buprestis* and *Elater* may be explained upon similar necessities, for the body of the larvæ of *Buprestis* is soft and necessarily so, living as it does in hard and unyielding substances, whereas the body of the larvæ of *Elater*, which lives in more damp, soft and cold substances, will find its stiff and hard dress more comfortable than it would a softer one. The larvæ of *Buprestis*, as well as that of *Elater*, are of a structure sufficiently similar to be placed in the same great division (B), and more similarity was not necessary, for the structure of the beetles themselves had to decide their systematic station.

POPULAR AND ECONOMIC ENTOMOLOGY.—No. 2.

THE APPLE TREE TENT CATERPILLAR — THE AMERICAN LACKEY MOTH (*Clisiocampa Americana* HAR.)

BY JAMES FLETCHER, OTTAWA.

There are two kinds of caterpillars which every year commit serious depredations in our Canadian apple orchards, although they by no means confine their attentions to that tree. These are the larvæ of the American

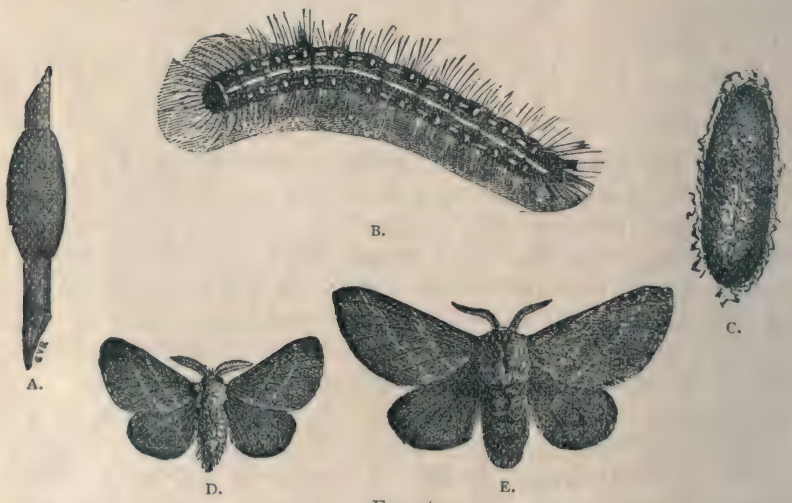

FIG. 1.

and Forest Lackey Moths, two species of brown moths which frequently fly into houses at night during July, and draw attention by their headlong, reckless flight, dashing themselves against the ceiling and the walls, and very often finishing up by getting into the lamp chimney. Speaking generally, there is a great resemblance between these two insects in appearance and habits, and the same remedies are applicable for both; when examined carefully, however, they differ considerably in all their stages, and may be easily recognized. They belong to the *Bombycidæ* or

Spinners, a family which contains the silkworm moths and several other thick-bodied, hairy moths, with large wings but small heads, bearing comb-like antennæ and having the mouth parts imperfect, or as in those now under consideration not developed at all. The caterpillars of the *Bombycidæ* are usually hairy or tufted, and when full grown spin a cocoon for the protection of the short, thick chrysalids.

At Fig. 1 the different stages of the American Lackey Moth are given. This species appears in the perfect state in the beginning of July, about a week earlier than the other species referred to above, which is known by the name of the Forest Tent Caterpillar *C. disstria* Hüb. *(C. sylvatica* Har.)

The American Lackey Moth is a pretty species of a dull but rich reddish-brown colour, having the upper wings crossed obliquely by two clear, whitish, parallel lines. In rare instances these show faintly on the lower wings also. The fringes of the wings are chiefly of the same colour as the oblique lines. The space enclosed between the light lines is paler than the rest of the wings in the males, but of the same colour or rather darker in the females. On the under side, all four wings are crossed by a well-defined, irregular, whitish bar. The perfect insects having their mouth parts undeveloped partake of no food, but devote the whole period of their short lives to the perpetuation of their kind As soon as they have paired and the females have laid their eggs they die. The eggs are deposited in rings upon the smaller twigs of various trees, usually within a short distance of the tips. Each egg-cluster contains from 200 to 300 eggs, which, when laid, are covered with a liquid glutinous substance which soon dries and cements them firmly together, and protects them from the weather.

A surprising point in the life history of these insects is that about a month after the eggs are laid, the young caterpillar is fully formed inside the egg and it remains in this condition all through the winter, only eating its way out from the egg in the following spring when the leaves expand. Immediately upon hatching the young caterpillars consume the glutinous covering of the eggs, and then lose no time in attacking the foliage. They at once begin the construction of their tent, which is a web of fine silk, spun in the nearest fork of the twig upon which they were hatched. This tent is increased in size as the caterpillars grow, and if left undisturbed is sometimes nearly a foot in diameter. The caterpillars are very regular in their habits, marching out in regular procession, each following close behind the

one in front of it. From the habit of the larvæ of this genus of marching out to feed in bodies they are known in Europe as "Processionary Caterpillars." When their appetites are satisfied they return again to their tents to rest. They do not feed at night nor in stormy weather. They usually do not leave their tent until after nine in the morning, and have all returned before sundown. They are generally inactive in the middle of the day.

When full grown the caterpillars are two inches in length, and beautifully marked with black, white, blue, yellow and brown in the pattern shown in Fig. 1., B. The continuous stripe down the back is white, and serves as a distinctive mark by which this species can be known at once from the Forest Tent Caterpillar—Fig. 2—which has this dorsal stripe broken up into spots. This latter also differs in not constructing a tent, but merely spins a mat of silk on the side of a tree, or upon one of the large branches, on and near which it lives, more or less, in community; but it has not the same social habits as its relative. Just before they spin their cocoons, the caterpillars wander about very much, seeking for a suitable place. The cocoon, Fig. 1., C., is greenish yellow, and contains a powdery material like finely ground sulphur. The moths emerge in about eighteen or twenty days after the cocoon is made.

FIG. 2.

Remedies.—The most successful remedies with these insects all come under hand-picking. During the winter or early spring the egg-clusters can be easily collected and destroyed; they are always laid upon the small twigs and near the tips, so that if a dull day be chosen they can be easily detected against the sky, and can then be cut off and burnt, when, of course, the trees are exempt from attack, until eggs are laid again next year. If this precaution is neglected, the nests, which are conspicuous objects before the foliage is fully expanded in spring, must be cut off and destroyed. An invasion from neighbouring trees can be prevented by tying a strip of cotton-batting round the trunk, which the caterpillars have difficulty in climbing over.

THE LARVA OF LIMACODES INORNATA, G. & R.

BY HARRISON G. DYAR, RHINEBECK, N. Y.

Larva.—Elliptical and much flattened, the sides rising slightly to two dorsal ridges, only a little elevated, these ridges diverging somewhat towards the anterior and posterior portions of the body. Around the outline of the body is a series of flattened pointed projections for the last eight segments, furnished on their sides with fine, short hair. These projections occur on each segment after the fifth, the two on the last segment somewhat longer than the others, and directed nearly straight backwards. Colour green, a reddish line on the angulated outline of the anterior segments; the dorsal ridges marked with a narrow yellow line, which is interrupted between two dorsal yellow spots with red centres. These spots are conspicuous though small.

Food Plants.—Maple, wild cherry, hickory, etc. Like most of the Cochliinæ a very general feeder.

A good figure of this insect is to be found in Harris's Entomological Correspondence,* and in the text Dr. Harris says: § [The larva is] "in form somewhat like an *Oniscus*, being oval and flattened, with lateral tooth-like appendages fringed with hairs. General colour green, with lateral rows of minute, ocellated spots, each pupillated with a black dot; a dorsal row of dark spots, with two of a rich scarlet colour * * * This insect does nor sting."

The difference between this larva and that of *Limacodes scapha* Harris† is very marked. While *L. scapha* is a thick larva, resembling a lump of some substance adhering to the leaf; the present species, as above stated, is much flattened, and furnished with its remarkable tooth-like projections. In fact, before the imagines of *L. inornata* were developed, I had no idea that the insect could be congeneric with *L. scapha.*

Two males, raised from these larvæ, differ somewhat from the original description by Grote and Robinson,‡ so that, to them, the name of "inornata" hardly applies. In this form the secondaries are somewhat

* Entomological Correspondence of T. W. Harris, edited by S. H. Scudder, 1869. Plate II., Fig. 7, and Plate III., Fig. 6, § *ibid*, page 176.

† Figured, *ibid*, Plate III., Fig. 8.

‡ Lepidopterological Contributions page 22, from Ann. Lyceum Nat. Hist., of New York, 1886.

darker above than in the typical insect, while the primaries are variegated by a ferruginous brown basal shading, continued narrowly along the internal margin and connecting with a similarly coloured band, extending, on its inner side, parallel with the external margin, but its outer edge starts from the outer margin above the internal angle and runs obliquely inward, so that the band ends in a point before reaching the costa. The upper part of this band, as well as the outer part of the basal shading, has a purplish tint. Fringe dark brown.

I should judge this to be the ordinary ♂ of L. inornata, in New York. A single ♀, also raised from these larvæ, fits the description above referred to.

CORRESPONDENCE.

ARZAMA OBLIQUATA.

Dear Sir: In reply to Mr. Moffat and Mr. Kellicott, I wish to say that both of these gentlemen are mistaken in saying that the larvæ of *Arzama obliquata* go to the shore in the fall of the year to stay over the winter. On the 25th of November last my friend, Chas. P. Mackisney, of Arlington, N. J., and I took a walk through the meadows at Arlington, which cover from fifteen to twenty square miles. We did not find any signs of *Arzama* except in one place about two hundred feet square, and there in every reed we cut we found a larva, but we had to cut below the surface of the water to get them. I went out to the meadows again to-day (the 22nd of February) in order to get some larvæ to send to Mr. Moffat and Mr. Kellicott, and I found some about four hundred feet from the shore, where I had to cut the ice to get to the bottom of the reeds. I got four larvæ and shall send them to these gentlemen in order that they may see for themselves that I was right in my statements (C. E., xx., 119). I also wish to state that if they require further evidence I should like them to come to New Jersey, and I will take them to a place where they can get a car load of cat-tail reeds with larvæ in them throughout the whole winter. I do not think that Dr. Riley is correct in saying that the female lays her eggs in masses. I have always found them deposited singly, and I do not think it likely that they would be laid otherwise, because it would be impossible for a number of larvæ to live in one reed.

H. H. Brehme, Newark, New Jersey.

ARZAMA OBLIQUATA.

Dear Sir: On reading Mr. Kellicott's communication in CAN. ENT. for February, 1889, I learn that his observations concerning the habits of *Arzama obliquata* G. & R. larvæ, do not agree with mine. Up to the 26th of January of the present year I held the same opinion as he does, and I was not a little bit surprised on hearing of its being a winter feeder. Requiring some lining for a few packing boxes which I was preparing to send by mail, I had occasion to go to the marsh for some stalks (commonly known as rushes, but by botanists, I suppose, as *Typha*), which make a convenient substitute for cork. The very first stalk that I cut showed that larvæ had been at work. This at once brought to my mind the recent communications of which Mr. Kellicott writes, so I began an investigation and was much surprised at the result. Besides a number of empty pupæ and a mature larva (which I always find in the form of a loop, with one end shorter than the other) at rest for the winter, down in the thick part of the stalk, I found three immature larvæ at full length up in the small part and surrounded by evidence of recent feeding. During my nine or ten years of collecting, I have raised both *Arzama obliquata* and *diffusa* from mature larvæ found on shore in old wood and other rubbish, mostly every year. Some I have found as early as November 3rd, and others in every month until May. Having always found them pretty plentiful on shore, I was of the opinion that it was their habit always to come there to transform, but my observations on the above date convince me that those I had hitherto found were only wanderers, while the main body remain at home to undergo their transformation. As for their being single brooded here I agree with him. I have found two or three moths late in July, but those I should say came from larvæ which passed the winter in the immature state, rather than from eggs laid that season.

March 9th, 1889. JAMES JOHNSTON, Hamilton, Ont.

NOTES.

We are glad to learn that Mr. John B. Smith, of the National Museum, Washington, has been appointed State Entomologist of New Jersey. He will enter upon his new duties on the first of April, and will reside at New Brunswick, N. J. While we congratulate the State upon securing the

services of so eminently capable an entomologist, we trust that Mr. Smith will find his new work congenial and satisfactory, and its accessories lucrative and comfortable.

The following amendment has been made to the Agriculture and Arts Act during the recent session of the Ontario Legislature :—"Section 67 of the said Act is amended by adding thereto, after sub-section (2), the following : 'Provided, however, that the Entomological Society of Ontario shall, at its annual meeting, group into five divisions the agricultural divisions enumerated in Schedule A. to this Act, and shall elect one person from each of such five divisions (who shall be a resident of the division he represents) as directors of the said Society.'"

The New York Academy of Sciences is making an effort to erect a suitable monument in Trinity Church-yard in memory of the great ornithologist, John James Audubon. About $900 has been collected, but the plans accepted call for from $6,000 to $10,000. It is earnestly hoped that each scientific society in America will contribute an average amount of $100 through its members, and thus enable the enterprise to be at once completed. Each subscriber of a dollar or more will receive a copy of a print from Cruickshank's celebrated portrait of the great naturalist suitable for framing. Remittances from our members may be sent to Mr. W. E. Saunders, 240 Central Ave., London ; or to Dr. N. L. Britton, Columbia College, New York.

The following is the list of the officers of the Kent Scientific Institute, of Grand Rapids, Mich., for 1889, which is incorporated for the promotion of scientific education and the establishment and maintenance of a natural history museum :—President, E. S. Holmes ; Vice-President, W. A. Gruson ; Recording Secretary, C. W. Carman ; Corresponding Secretary, E. S. Holmes ; Treasurer, C. A. Whittimore ; Director of the Museum, W. A. Gruson ; Curator, C. W. Carman ; Librarian, E. L. Morely. Board of Directors:—Wright L. Coffinberry, W. A. Gruson, Samuel L. Fuller, E. S. Holmes, J. W. Jones, C. A. Whittimore. Officers of the Board :—Chairman, W. A. Gruson ; Secretary, E. S. Holmes ; Treasurer, C. A. Whittimore.

Mailed April 8th.

The Canadian Entomologist.

VOL. XXI. LONDON, MAY, 1889. No. 5.

DESCRIPTION OF THE PREPARATORY STAGES OF ARGE GALATHEA, LINN., WITH NOTES ON CERTAIN SATYRINÆ.

BY W. H. EDWARDS, COALBURGH, W. VA.

(Continued from page 71.)

How then can Mr. Scudder claim that this feeble relic of the tertiaries, stranded, as he tells us, on the loftiest peaks at east and west at the close of the glacial period, unchanged in all respects since that, its imago showing itself but once in two years, the individual living at most but a few days, always in tribulation and peril, saved only from extinction by its acquired habits of dropping into a crevice, or of clinging to the rocks by the feet, its wings of scarcely any use whatever, but a constant source of danger—that this miserable creature stands at the head of its genus, its sub-family, its family, of the American fauna, and in fact of the world, the ideal butterfly !*

The mere statement of the proposition that such a tribe, creepers along the ground, avoiding sun-light, allied to the moths at every stage, often with habit of moths rather than butterflies, have high rank in the order, and that the weakest member of the tribe—the one which has suffered most by isolation and privation—is the highest of all, carries its own refutation.

When a process of reasoning leads to an absurd conclusion, there is a flaw somewhere. The facts may be mistaken, or wrongly presented, and, in either case, the inferences attempted to be drawn from them may be without justification.

Mr. Scudder is compelled to allow, that in three stages out of four, the Satyrinæ are nearer the Hesperidæ and the moths than to other butter-

* We have the expression "the highest butterflies," meaning the Satyrinæ, repeated endlessly, sometimes twice on one page, when "Satyrinæ" would answer every purpose. It seems to me the author of the work, appealing to the reason of his readers, makes a mistake in thrusting his opinions before them so persistently. If the arguments fail to convince, what he calls by one name, will be thought to deserve quite another.

flies, namely: in the egg, larva and pupa. "In certain features, the Satyrinæ show some *curious resemblances* to those of the Hesperidæ. * * * The eggs of the ribbed species *closely resemble* those of the Hesperidæ in general appearence. The caterpillar, at birth, has a *similarly large and striking head*, and occasionally the terminal segments of the body *are armed with much longer cuticular appendages* than elsewhere—a common feature among the Pamphilas; the mature caterpillar is sluggish, with a somewhat flattened belly and short pro-legs, giving a limaciform body, which is clothed with pile only; the chrysalis *is unusually rounded*, and *occasionally is not suspended*," &c.—But. N. E., p. 120. In his "Butterflies," N. Y., 1881, he says:—"It is one of the *most curious features* in the structure of butterflies *that its highest*," and here he means the Satyrinæ, "*and its lowest should resemble each other in so many minor points.* For instance, the *tone and colouring on the wings* of many Satyrinæ, as well *as the position and general nature of the sexual marks on the front pair* (of wings) of some males, find a close counterpart on the wings of some Skippers (Hesperidæ). So also the chrysalids of the Satyrinæ are among *the simplest, most rounded and compact in the whole family, approaching in this respect the lowest butterflies.*" That is, not only are there "curious resemblances" in the three stages, but very important ones in the fourth stage. Speaking of the same things in But., N. E., p. 120:—"That these peculiarities have some phyletic meaning it is impossible to doubt;" but what it is, the author does not venture to conjecture. To me the meaning is plain enough. They indicate the close affinity of the Satyrinæ with the "lowest" butterflies. "Nevertheless," we are told, "in all the prime features of their organization, the Satyrs outrank all others." They must be extraordinary features to outweigh all these "curious resemblances," these "peculiarities," with their "phyletic meaning," and to raise the nearest relatives of the Moths to the head of their order. As is natural, the author of these volumes is inclined to make the most of every point that can be construed to tell in favor of his hobby, and to make little of whatever tells the other way. If nothing else can be said, we shall hear that any given case which presents itself obstructively "is entirely explainable as an instance of reversion." In this way are got rid of, or slurred over, some very important facts; thus, "the only case among the higher butterflies" (higher this time means above the Hesperidæ), "where a cocoon, properly

speaking, is made, is in the sub-families most closely allied to the Hesperidæ, among the groups of Parnasinæ and Anthocharinæ." (I very much doubt any cocoon in an Anthocharis, myself); quite ignoring the cocoon of *Semele*, as figured on our plate. "And, again in exceedingly feeble instances, where the necessities appear to be overwhelmingly great, among the higher Nymphalidæ, which have lost even the last remnant of the cocoon of moths, viz., in some of the Satyrinæ, which lack cremastral hooks and undergo their transformations ordinarily in the rudest form of a cell, which they can construct above or at the surface of the ground by the mere movements of the body and the spinning of one or two threads of silk." The "necessities" may have been overwhelmingly great in the case of *Semidea;* but what of *Jutta*, a species of the same genus, living in Maine, and of *Semele* and *Galathea*, at the level of the sea, in temperate Europe! Among the great sub-family Satyrinæ, with its multitude of genera, of nearly all of which the habits at pupation are unknown, it is probable enough that the heterocerous style of pupation is common. To refer such cases, in a group claiming to be farthest removed from the moths, to atavism from the moths, will not do. There are too many of them. And the same sort of ancestral traits crop out in the color and sexual markings of the imago, in the egg and larva, as well as in the pupating habit.

In the "Butterflies" three "prime features," as they are called, are given, viz: The pupating habit, with the flat ventral surface of the pupa among the Nymphalidæ, the papillae on tongue, and the atrophy of the fore legs. In the But. N. E., so far as I see, the papillae prime is dropped, as well it might be. We are told in the former work, p. 255, that this feature consists in the complication of the structure of the papillae of the tongue. In the Papilios and Skippers "these are merely minute tubercles, * * * seldom rising much above the surface. In the Lycænidæ they are longer and more frequent, while in the Satyrinæ they are often half the breadth of the tongue in length, closely crowded together, and often trifid at their tips." (Of course this feature can only be made out by a powerful microscope.) How one of these conditions is an advance on the other is not explained, and I will venture to say is not explainable. Each species of animal, mammal, butterfly, or what not, has a tongue suited to its habits. A cow or a sheep has that organ adapted to grass feeding, a giraffe has one that is half a yard long, and prehensile at that, and feeds off the tree tops; but whoever heard that the

giraffe was exalted because of its tongue, or of the sensitive papillae! If a Lycænid butterfly, expanding half an inch, has papillae on his tongue twice as long in proportion as his great neighbour Papilio, he probably has need of them, and it is pleasant to think he has got them, and is comfortable, and his gastronomic enjoyment big for his size. Surely that "prime feature" does not outweigh the "curious resemblances" spoken of as running through the whole life history.

The resemblance between the pupating habit of the Papilionidæ and the Hesperidæ must be a very obscure and distant one, if, as is stated in B. N. E., 72, it has been observed by no author save Mr. Scudder. The facts have been known from the day of Linnæus to every systematist; but no one has thought of any particular resemblance between the styles of pupating. And now that Mr. Scudder expatiates eloquently upon it, I, for one, fail to see the point. There are attachments of the pupæ that are clear, but they are very different. But allowing all that the author claims, inasmuch as he denies that he has ever said that the Papilionidæ were evolved from the Hesperidæ, one of these modes of attachment cannot have grown out of the other; one is no advance on the other. It is held that both families were evolved out of a "common stock," but what feature that stock had no man can tell.* It may not have been a moth; but the moths and butterflies may both have arisen independently from something else and now unknown. Any resemblance, therefore, whether distant or near, must be charged to the conditions and environment when the types of these families first appeared, and of that we can and shall know nothing. "The necessities" may as well have been "overwhelmingly great" in this case as in the one cited by Mr. Scudder, and being the same for both types, there may have resulted a form of attachment suited to each, and bearing some resemblance. But this involves no relationship. In other words, resemblance is not identity, nor does it imply identity.

As the argument runs, the moths pupate inside a cocoon, with no

* I am informed by Prof. J. A. Lintner that suspension of pupa is very rare among the moths, but that cases occur in which certain members of a family are suspended by the tail alone, and others of same family by both tail and girdle. "In the Geometridæ, the pupa of the Ephyridæ is suspended by the tail, and in some of the species there is also a transverse girdle as in the Papilionidæ." That is a queer state of things if one mode of suspension is more advanced than the other, or than none at all. Among the moths what are called the higher families are not suspended. Some pupate naked, some in cocoons, and neither mode implies rank.

attachment, or with no cocoon, in or on the ground; the Hesperidæ in a folded leaf, or in two or three leaves brought together, having the tail of the pupa attached to the end of the case by a Y-shaped thread, and the body held by another Y-shaped thread (But. 256). The Papilionidæ and Lycænidæ weave "a carpet of silk" by which the hooks of the tail are held fast, and spin a real girdle of many threads, into which they thrust head and anterior segments. But, in the Nymphalidæ, there is no girdle, and the pupa hangs by the tail from the carpet of silk. Finally, as we have seen, many of the Satyrinæ weave no carpet, indeed have no hooks by which the pupa could hang, and so pupate naked in or on the ground, or in some cases, as in *Semele*, in a cocoon. Others that do not make a cocoon, spin threads by which leaves are girded about them, a style which Mr. Scudder calls a cocoon "by courtesy," as Erebia *Epipsodea* and some examples of *Galathea*. All these last, therefore, behave in the manner of the moths.

Oddly enough, Mr. Scudder has got himself in a state of mind to claim that these unattached pupæ have reached the greatest advance of all. "We see, therefore, a regular progression from the lower to the higher butterflies, in the loss, first, of the cocoon, next, of the girt; and, as if this were not enough, some of the highest butterflies have even lost the last remnant of silk and fallen to the ground." That is to say, a reversion to the habits of the moths is an advance in grade. Continuing: "As if to show that the suspension by the tail alone is a stage beyond that of hanging by tail and girdle, we have a clear proof that all the Suspensi have passed through the stage of the Succincti, since *the straight ventral surface of the abdomen*, assumed perforce by the Succincti when they left the cocoon stage, and became attached to hard surfaces, *still remains in the chrysalids of the Nymphalidæ*" (these italics are Mr. Scudder's), "where it no longer serves any purpose—as clear and striking an indication that the Suspensi outrank the Succincti, as that the pupa is higher than the larva."—But., 258.

I deny the fact alleged, that the pupæ of the Papilionidæ, which being the first to leave the cocoon stage, and "perforce assumed" a flat ventral surface, have that sort of a surface. I never saw such a thing in one of the Papilioninæ; they are all rounded, as in *Turnus*, or rounded and bent back in the middle, as in *Asterias*, *Troilus* and *Philenor*. In many, as the whole of *Turnus* group, the dorsal side is straighter and flatter

than the ventral. Among the Pierinæ, the pupæ of some of Pieris, as *Rapæ* and the *Napi* group, have a tolerably flat ventral surface, others of the same genus do not. And Neophasia, Anthocharis, Callidryas, Terias, Colias, Nathalis, all which I know well, have anything but a flat ventral surface. Among the Nymphalinæ, many of the genera have no such surface, as Argynnis, all the Vanessinæ, Limenitis, etc., etc. The Heliconinæ do not. And, admittedly, the Satyrinæ have pupæ "among the most rounded in the whole family." Moreover, among many of the Satyrinæ the dorsal side is as much flattened as the ventral. The supremacy of the Satyrinæ, and with them the Nymphalidæ, cannot be proved from the shape and conditions of the pupa any more than from the papillae.

The third prime feature consists in the extreme degree of atrophy of the fore legs of the imago. The Hesperidæ have six walking, useful legs; the Papilionidæ the same number. The Nymphalidæ, however, have in both sexes but four walking legs, the first pair being deformed, atrophied, useless for walking, and, so far as is known, for any purpose whatever. It is exactly the sort of phenomenon not very infrequently seen in the genus Homo, but here a crippled or atrophied limb has never become a hereditary character. It certainly would not be regarded as a mark of elevation. How atrophy of the legs originated in the butterflies no one can tell, but perhaps by accident in a single member of the type form, and became perpetuated in a family. In the Lycaenidæ, we are told, But., 254:—"All the legs of the female are alike, but the front legs of the male are variously aborted." In the But., N. E, 203:—"As soon as we approach the Lycaenidæ, we notice signs of an approaching abortion of the fore legs, but only in the male;" described as slight; but is greater in the Lemoniinæ. It affects both sexes in the Nymphalidæ, but not in one of the sub-families, the Libytheinæ. These have six good legs in both sexes. And, in the Satyrinæ, the deformity is the most extreme of all. Indeed, unless the front pair of legs should drop off, it is not easy to see what more could be done in that direction. A disfigurement is not generally regarded as a sign of beauty, though tastes do differ. In certain valleys in Switzerland, he who can show the most enormous goitre is the pride of the district. Atrophy of limb, if it prevails throughout a family, may properly be held to be a mark of degradation. It is a phenomenon not confined to any particular order of

insects. There are moths with atrophied wings and legs, carried to a surprising degree; and plenty of instances among the Coleoptera, but few persons would call the loss of essential organs a mark of "aristocratic distinction," as Mr. Scudder does on p. 74, But. N. E. One great family of butterflies is neither fish nor flesh. One sex of a Lycaenid (including the Erycinids) has six useful legs, and is, therefore and thereby a degraded creature, almost, or quite as "low" as a Papilio; but, its mate has its fore-legs always deformed, often utterly crippled, and, therefore and thereby, it is separated from its female, fit company for the "aristocratic" Satyrs! The argument on legs is not tenable. In fact it seems remarkably like nonsense. Deformity can have no ranking value, unless to mark degrees of degradation, and no argument based on the legs of the imago, no matter what their condition, can outweigh that based on every one of the four stages of the insect.

I put the question to a great authority on biology, one whose praises are sounded in both hemispheres, who, moreover, is thoroughly acquainted with Mr. Scudder's argument: "Is atrophy of legs a mark of development?" and the answer came: "Atrophy is not a mark of development." On that rock I stand.

Mr. Scudder's hypothesis of the evolution of these families is obscure, because the language used in different places conveys very different meanings, and, anyway, the hypothesis is peculiar. In But., 244, we read: "Doubtless the Skippers first separated from the common stock; the other families appear to have diverged simultaneously from each other soon after their common separation from the Skippers;" and a diagram presented on page 246 is explained thus: "The position of the main branches and their divisions is supposed to indicate the relative time at which the groups diverged from each other, or from the main stem, and *the height which each branch attains the relative perfection of the highest members of that group.*" In accordance with the author's prepossessions, the stem which is terminated by the *Satyrinæ* is highest of all, in fact six and a-half inches long, evidently limited only by the length of the printed page, and goes straight up from the base (that is, from the "common stock," while the Skippers diverge from the stem at half an inch from the base, and the Papilionidæ and Lycænidæ at another half inch simultaneously, one on one side of the stem, the other on other side. (That is, as if from a setting of hens' eggs were to issue humming birds and eagles.)

The Nymphalidæ begin to branch at an inch and a-quarter above the Papilio, first coming the Libytheinæ ; then at another inch the Nymphalinæ, and above them the Satyrinæ, at two and a-half inches. This two and a-half inches "indicates the relative perfection" of the Satyrinæ over the rest of the Nymphalidæ. The "perfection" of the Satyrinæ to the Papilionidæ is as 6.5 is to 1. Truly a parlous elevation for the giddy *Semidea* and its peers! Anyone can draw a diagram, and if I were to use the one made by Mr. Scudder, I should put the Satyrinæ at the first branch above the Skippers, and the Papilioninæ at the top, and the proportion of perfection would be for the latter as 6.5 to 1 of the other. Mr. Scudder assures us that all the Suspensi have been Succincti, and that the evidence "is clear and striking," but his only witness to the fact is discredited. As the moths, in general, have no attachment at all, if the moths are indicated by "the common stock," it is not clear why the Papilionidæ were "perforce" obliged to assume the girdle and button on leaving the main stem. The next stage to no attachment would seem likely to be the single attachment, but whether that was *perforce* assumed we have no means of knowing. It would also seem that the double attachment is the widest departure from the condition of no attachment at all, to be reached after the longest period of time, instead of the shortest. That from no attachment a sudden leap should be made to a double one and then come back to a single one, to culminate in none at all, as it began, is an unreasonable proposition. To me it seems clear that the condition of no attachment found in so many Satyrinæ is closest to the habits of the moths ; the single attachment or button comes next, and the double attachment is the final outcome, "showing the perfection of the highest members of the group," namely, the Papilionidæ. Mr. Scudder tells us, and this time we concede the reasonableness of the proposition, that "it is unphilosophical to accord high rank to any group for a single characteristic, especially when, in nearly all its other peculiarities, it evinces its low origin."—But., 250. On this ground the scheme of elevating the Satyrinæ very properly fails.

But, while the diagram cited and the language sometimes used, would give the impression that the author did not intend to make one family evolve from another, other language certainly implies that this did take place, that what are called the higher families all passed through the stages of the lower, and in evolving sloughed off the lower class of habits

more or less completely, till an "aristocratic" perfection was reached in the Satyrinæ. "The Hesperidæ have epiphyses; the Papilioninæ the same; in the closely allied sub-family, Pierinæ, the epiphyses disappear." —But. N. E., 73. "*There is the series, leading from the Hesperidæ in a direct and unbroken course through* the Papilioninæ, Pierinæ, Lycæninæ, Lemoniinæ *to the Nymphalidæ*, and *culminating* in the Satyrinæ" p. 74. That can mean nothing else than a sort of fishing-pole style of evolution, in which every joint proceeds from and was inclosed in a preceding one. That involves greater difficulty, even than the other plan. The big Papilio is to come out of the little Hesperian, the tiny Lycæna from the big Papilio, the robust and often great Nymphalid from the tiny Lycænid, and the series is to culminate in a weakling Satyrid, aristocratic, if at all, only in the sense of being effete, exhausted, "petered out."

Mr. Scudder insists strongly on the two evident series—one, of the style of pupating; the other, of the condition of the legs. But, what if these series are imaginary? The pupation begins and ends with the moths, and is in a circle, as I have shown, and, therefore, is not in a series. Let us see about legs; first, six good legs; next, slight atrophy in the fore-legs of one sex; then a little farther atrophy; next, six good legs in the Libytheinæ; then complete atrophy in both sexes, and at last extreme atrophy. Using the diagram before referred to, in which "the height which each branch attains, indicates the relative perfection" of the several groups, the whole length of the stem being 6.5 inches; we find the Papilionidæ at 2 inches, the Lycænidæ at 3, the Erycinidæ at 3.25; the Libytheinæ, having six legs, must be rated at 2; the Nymphalinæ 4.25; the Satyrinæ 6.5. This will then run 2, 3, 3.25, 2, 4.25, 6.5. The mathematical name for this sort of series I do not find, but I think it is what is called the illusive—such stuff as dreams are made of. Not substantial enough to base an argument on!

Another thing one would like to have an explanation of. If there ever did arise a tendency towards deformity, and the deformity was a development, why, in the Lycænidæ, it halted at a slight degree, and left all the species of this great family, divided into hundreds of genera, in exactly the same condition? Why it advanced a bit farther in the Erycinidæ and halted, and why both these families have halted for these myriads of years? Why they are not as perfect, in all respects, as the Nymphalidæ, with but four good legs in both sexes—four legs being

the test of perfection? Why, in the Libytheinæ, part of the Nymphalidæ, there are six good legs in both sexes, though they evolved from the tainted Lycænidæ? These little difficulties will thrust themselves into notice when surveying Mr. Scudder's great scheme. It is very odd that the disease we are talking of should have burst out with virulence one step beyond the healthy Libytheinæ, and have swept all before it to the Satyrinæ, who yet have managed somehow to live through the 800,000 years.

There is no trace of butterfly life back of the tertiaries. The formation, next below that, is the cretaceous, adverse to butterfly beginnings. Now, the beginning of the tertiaries is estimated by geologists as somewhere about 800,000 years ago. All of a sudden the shales are full of insects, and we learn by Mr. Scudder's "Fossil Butterflies," 1875, and by his later papers, that the very earliest butterflies, whose remains are found, were closely like what we see to-day, the same families and subfamilies, so far as the examples go, which are recognized now. In the Fossil Butterflies, nine species are treated of from the Eocene and Miocene. Of these nine, two belong to the Pierinæ, one to the Parnassinæ, four to the Nymphalidæ, and two to the Hesperidæ. Of the four Nymphalidæ two belong to the Satyrinæ, and one of them is stated to be very close to Debis (Enodia) *Portlandia* of the United States. The other to be nearly allied to an existing Bornean species. We read, page 83 :—"Our present knowledge places the apparition of butterflies towards the end of the lower tertiaries." It appears then, that on the earliest horizon the "highest" butterflies, as Mr. Scudder esteems them, were living side by side with the "lowest." In the next horizon we find a Hesperid, a Pierid of a genus used in the Butt. N. E., viz., Pontia, and a Nymphalid, also belonging to one of Mr. Scudder's genera, Eugonia, which he created for Grapta *J. album*. Since 1875, the American tertiaries have yielded seven other butterflies, of as many species. One is a Pieris nearly allied to *P. Rapæ*; five are Nymphalinæ, and one is a Libythea; this last is so well preserved that its legs are clearly to be seen, and Mr. Scudder says that "the fore leg is of the same structure as in the genus to-day."—B.N.E., 759. That is, it has six walking legs, though all the rest of the Nymphalidæ have but four. Evidently on the leg classification it is a black sheep, and should be hustled out of the Nymphalidæ. Further, we are told that in one of the Nymphalinæ the legs show that "the atrophy of the fore legs had reached the same

stage which it now possesses."* It appears, then, that while some genera are extinct, others are represented by modern genera very near them, and two belong to genera in use to-day. But the families and sub-families, even to the aberrant Libythea, were as sharply defined as they are to-day. Every family recognized by Mr. Scudder is represented, except the Lycænidæ, but their absence is accounted for by reason of "their exceedingly delicate structure and small size;" and it is added, "but there are intimations of the presence of some of their caterpillars in amber," which is a product of the tertiaries. And there is not a species about which there is a doubt as to what family and sub-family it belongs. The neuration of wings, the legs, palpi and antennæ were just as now. It is proved, therefore, so far as there is any evidence at all, that since the Eocene, the families and sub-families of butterflies have not changed an iota. Mr. Scudder is happy in the poetical quotations prefixed to his chapters, and he might have put over the one on fossil butterflies, "Such as creation's dawn beheld, we see thee now." New species have been evolved and new genera, but no new families. Of sub-families we miss *that of the Papilioninæ*, whose absence, considering their size and stout texture of wing, and especially if they were among the first to evolve from the "common stock," and, therefore, were always present when any butterfly at all was flying, is remarkable. If they were really the latest to develop, we can understand their absence.

From the beginning of the tertiaries there was a steady advance in the grade of mammals and birds. The supposed ancestors of existing species in these classes are found there, new types manifesting themselves as the period progressed. The families are not those of to-day, but one has developed into many. This very week there is going the rounds of the papers a description of the mammal Phenacodus-primevus, an animal both herbivorous and carnivorous, from the Eocene of Dacotah, which Dr. Cope considers the ancestor of the elephant and giraffe, the plantigrades, the carnivora and hoofed animals of to-day. But, in the butterflies, there is no evidence of any change whatever.

The hypothesis, advanced by Mr. Scudder, calls for a duration of time which is inadmissable. It is a problem in the Rule of Three; if butter-

* If, as I have supposed, the atrophy of legs originated suddenly and to full extent in the type, and was perpetuated by descent, we can understand why it appears on the earliest horizon; otherwise, not. But if it was a malformation from the first, no degree of perpetuation would change its character.

flies, in the family and sub-family characters, have not changed in 800,000 years, how long time would be required to bring them out of the "common stock" to the grade they had reached in the Eocene? Perhaps the advocates of leg classification can solve it.

Mr. Darwin, in his fourth chapter, gives a diagram explaining his views as to how varieties appeared, and how, from simple variation, genera and families might come to be formed. Starting with several species of a widely distributed genus, which resemble each other in unequal degrees, he represents their offspring by divergent lines—the divergency in each case showing the variation in the descendants of the original species. Many variations appear in one or more of the groups, some of which go but a little way; others flourish, and in their turn give permanent varieties. Some of the original species die out, and, at length, after many thousands of generations, the surviving descendants of the original species are separated into distinct groups of unequal value, and which may be regarded as families and sub-families. The branches, that is, the descendants of the original species, do not evolve one from the other, but are all advancing in their own way, unequally. That kind of evolution is intelligible, at least. One group of butterflies, starting from the "common stock," whatever that may have been, would come to have one manner of pupating, or its bodily organs of a particular pattern; another group a different manner and pattern. The groups are not departing in every respect, or at all equally from the parent form. No matter how far removed in time from the parent, one feature or other may be retained through all the history. Evidently, no such duration of time is required to bring the order of butterflies to their present condition, as is called for by the other scheme treated of. Whether, of the several groups existing at any given period, one were higher in the scale of existence than another, would depend, not on the deformity of a pair of legs, nor the style of pupating, or the papillæ on the tongue, or the presence of a "tibial ephiphysis," but, in the harmonious development of the whole organization. There can be no ascending scale, because one family did not develop out of another, but each separately, and according to the surrounding.* If there is a highest family among the butterflies, as among mammals, the quadrumana,

* There is no evidence whatever that a butterfly sprang from a moth, and it is a fair proposition that all families of the Lepidoptera, diurnal, crepuscular, nocturnal, came from a common parent, and were developing at same time, each in its own way. This calls for vastly less time than the fishing-pole style of evolution.

birds, the thrushes, it is the Papilionidæ, and the Satyrinæ must go to the bottom, carrying the Nymphalinæ with them.

This matter of relative rank was discussed by Mr. Alfred Russell Wallace, a man who "sees clear and thinks straight," in 1864, with a treatment worthy his high standing as a naturalist, and the argument then advanced has proved unanswerable. It is based on general principles, and no special pleading from diseased legs, or papillæ, or pupæ will touch it. Indeed, the conclusion reached by Mr. Wallace is so manifestly proper that the test of any other theory on the matter must be whether or no it arrives at the same conclusion. I am glad to be able to quote the argument, as probably it is new to many of the readers of this magazine: "Butterflies and moths are broadly characterised by their diurnal and nocturnal habits respectively, and the Papilionidæ, with their close allies, the Pieridæ, are the most pre-eminently diurnal of butterflies, most of them lovers of sunshine, and not presenting a single crepuscular species. The great group of the Nymphalidæ, on the other hand, contains an entire sub-family (Brassolidæ), and a number of genera, such as *Thaumantis*, *Xeuxidia*, *Pavonia*, etc., of crepuscular habits, while a large proportion of the Satyridæ and many of the Danaidæ are shade-loving butterflies." He then speaks of certain special characters in the Papilionidæ, the most noticeable of which is the tentacle for self defence, in second segment, which every one of the Papilionidæ is provided with: "Such a structural addition to the organization of the family, subserving an important function, seems to me alone sufficient to warrant us in considering the Papilionidæ as the most highly developed of the whole order." He speaks of the "tibial epiphysis," common to the Papilionidæ and some Hesperidæ, which was supposed by some authors to show a direct affinity between the two groups.* These examples, I think, demonstrate that we cannot settle the rank of a group by a consideration of the degree in which certain characters resemble or differ from those in what is admitted to be a lower group; and they also show that the highest group of a class may be more closely connected to one of the lowest than some other groups which have developed laterally, and diverged farthest from the parent type, but which yet, owing to want of balance, or too great specialization in their structure, have never reached

* Here is another character which could not have passed into the Papilionidæ from the Hesperidæ. Whether the "common stock" had it no man can tell.

a high grade of organization. The Quadrumana affords a very valuable illustration, because, owing to their undoubted affinity with man, we feel certain that they are really higher than any other order of Mammalia, while at the same time they are more distinctly allied to the lowest groups than many others. The case of the Papilionidæ seems to me so exactly parallel to this, that, while I admit all the proofs of affinity with the undoubtedly lower groups of Hesperidæ and moths, I yet maintain that owing to the complete and even development of every part of their organization, these insects best represent the highest perfection to which the butterfly type has attained, and deserve to be placed at the head in any system of classification."—Nat. Selection, 139 et. seg. It is useless to attempt to disparage the value of the characters cited by Mr. Wallace, as Mr. Scudder does in But. N. E., 74; calling them "utterly insufficient," or to say that they indicate low rank, or have no token of high character about them. To those who also can "see clear and think straight" the argument will be satisfactory.

It accords with reason, that if there is to be, in the future, any advance in the development of the butterflies, it will take place among the sun-loving, many-brooded species of the sub-tropical and tropical regions, where the imagos of the collective broods live fully half a year, rather than among the shade-seeking species, which, according to Mr. Scudder, are mostly one brooded, and numbers of which, as we have seen, live but a few days, with adverse surroundings. It is among the Papilionidæ that variation, and modification and polymorphism run riot, as both Mr. Wallace and Mr. Bates have related. Even in our own limited fauna, we have two species which are dimorphic and polymorphic. But in the eastern Archipelago, every island has a modified form of certain widely distributed species, and several of these species have from two to four different sorts of female. In particular islands the individuals have changed in shape of wing, in neuration and in color. It is out of this family we may expect that species and genera will be evolved.

I, myself, do not consider the Pieridæ as part of the Papilionidæ, having been led to that conclusion by study of eggs, larvæ and pupæ of many species of each family. In these stages the differences are as great as can well be. On page 120, But. N. E., Mr. Scudder says of a paper of mine which appeared in this magazine: "The facts brought forward show that the arrangement of the genera commonly adopted in Europe is

altogether unnatural, as one would expect to find it, founded solely upon a few characters drawn from the neuration of the wings," adding, "an excellent opportunity for inaugurating a new and more substantial classification is now open to the general student." Instead of genera, say genera and families. In my view, the Pieridæ form a natural family, the Parnassidæ another. After these come the Erycinidæ and Lycænidæ, then the Nymphalidæ, with Satyrinæ next the Hesperidæ. With this arrangement, the "curious resemblances" noticed by Mr. Scudder in all the four stages of the Satyrinæ to the Hesperidæ puzzle no longer; the "phyletic meaning" is intelligible, and we can admire the fitness of things in general.

ERRATUM.—The word "turned," on page 66, line 13 from top, should read "tumid."

NEW SPECIES OF CANADIAN TENTHREDINIDÆ.

BY W. HAGUE HARRINGTON, OTTAWA.

1. NEMATUS OCREATUS.—♀. Testaceous or honey-yellow; length, 0.35 inch.

Head polished, sutures behind ocelli well defined; ocelli in a slightly curved line with the lower one on the rim of a large shallow basin; face below antennæ whitish, especially a triangular spot at their base; mandibles reddish; a dark impressed point above each antenna, another between them, and one on edge of occiput; antennæ slender, two-thirds as long as body, black with basal joints paler; joints three and four subequal; five shorter.

Thorax with sides of prothorax paler; the meso-thorax darker with a black line on the lateral lobes, and a dark spot within at the base of this line; metathorax with tip of scutellum and post-scutellum and the sutures narrowly black; wings large, hyaline, irridescent; nervures blackish; stigma and anterior border pale; legs unicolorous with body; the extreme tip of posterior tibiæ and their tarsi in part, brown or blackish.

Abdomen stout, slightly longer than head and thorax, uniformly honey-yellow, paler below laterally; basal plates margined with black, and with a dusky spot at side; ovipositor sheaths polished, transparent, plainly showing the large ovipositor; cerci long, black at tips. One specimen captured near Hull, Q., on 16th May, 1886.

2. HARPIPHORUS VARIPICTUS.— ♀. Length 0.35 inch; expanse wings 0.80.

Head and thorax black with white markings; antennæ with terminal joints white; abdomen and legs rufo-testaceous. Head black, with shallow punctures; distinct sutures from base of antennæ to vertex; clypeus truncate; labrum rounded; clypeus, mandibles, palpi, entire orbits and posterior angle, triangular spot at base of antennæ, the tips of two basal joints, sixth in part and seven to nine entirely white.

Thorax polished, black; borders of prothorax, tegulæ, a large spot on flanks, a smaller one over middle coxæ, the scutellum, two short lines on lobes of meso-thorax, the cenchri, the coxæ in larger part, and the trochanters, ivory white; wings hyaline, with a slight yellowish tinge; nervures brown, stigma and costa testaceous; lanceolate cell with straight crossline; hinder wings with one middle cell. Legs, except coxæ and trochanters, rufous; tips of posterior femora, and a dot on tip of tibia behind, blackish; inner spur of anterior tibia strongly bifid; all the claws bifid, rufous.

Abdomen rufo-testaceous above, paler beneath. Captured by Mr. Fletcher, while collecting with me near Hull, 10th June.

This handsome insect is near *varianus* Nort., and *versicolor* Nort., and has also a strong superficial resemblance in size and coloration to *Strongylogaster pallidicornis* Nort. The venation of the anterior wings is peculiar; the lanceolate cell in each has two short straight cross-lines, which form a small cell near its middle.

3. PHYMATOCERA NIGRA.— ♀. Robust, shining black; length 0.20 inch; breadth of wings 0.45 inch.

Head broad, but not so wide as thorax; a brief groove above each antenna and each posterior ocellus; clypeus truncate, labrum edged with white, tips of mandibles rufous; antennæ as long as head and thorax, slender, gradually tapering to tip; joints 3 and 4 sub-equal, 5 slightly shorter, remainder of nearly equal length.

Thorax polished; beneath with very fine short pubescence; wing-scales white; median lobe of meso-thorax short, sutures faint, scutellum sparsely punctate; flat, polished, with two shallow pits at base; wings hyaline; nervures brownish, first recurrent received in middle of second submarginal cell, second recurrent about one-third from base of third submarginal cell, nervure dividing marginals straight; legs whitish, base of

the anterior and intermediate and most of posterior femora black, tips of tarsi, especially the posterior ones, piceous or blackish.

Abdomen short and stout, with very fine yellowish pubescence, more abundant on terminal segments; ovipositor conspicuous, sheathes black, shining.

Described from five specimens, all ♀, collected in this vicinity. In general appearance it much resembles *Monophadnus medius* Nort., and might be readily mistaken for that species, except for the antennæ. It even more closely resembles a Blenocampa, which I take to be *B. paupera* Prov.

4. MACROPHYA PROPINQUA.—♀. Black, length 0.5 inch; expanse of wings 1.0 inch.

Head broader than thorax; clypeus emarginate, labrum truncate, both white, line on mandibles white, palpi whitish; antennæ slightly swollen in middle, joint 3 nearly as long as 4 and 5; two indistinct white dots on edge of occiput.

Thorax with slender white line on edge of collar and of wing-scales; meso-thorax polished, moderately punctured and slightly pubescent, median lobe sulcate; scutellum convex, more coarsely punctured and pubescent; a line on anterior and middle coxæ and most of their trochanters, a large spot on posterior coxæ, with trochanters entirely, white; a white line on anterior tibiæ before, extending nearly half way on femora; tarsi with all the joints white, tipped with black, except first joint of posterior, which is black, with a small white dot at extremity without; edge of basal plates white; apical half of wings pale fuliginous; abdomen stout, polished.

Described from two ♀ collected in July. This species is closely allied to *M. tibiator* Nort., but differs in having the posterior tibiæ entirely black.

Var. a, ♀.—Two specimens, also collected near Ottawa, differ in having only the sutures of trochanters white, and in having more black on the tarsi and anterior legs, with a dusky spot on clypeus and labrum.

5. TAXONUS RUFIPES.—♂. Black, legs rufous; length 0.35 inch; expanse of wings 0.65 inch.

Head finely punctured, with a fine pubescence, more marked upon the face and basal joints of antennæ; ocelli in a triangle, the lower one at the summit of a bell-shaped shallow depression, the channels at sides

of ocelli terminating behind in a deep puncture ; clypeus short, scarcely emarginate ; palpi piceous ; antennæ long, stout ; joints 3 to 9 sub-equal, terminal joint blunt at apex.

Thorax polished ; tegulæ, with a large angulated spot before on prothorax, pale rufous ; legs rufous, except base of coxæ and tips of some of the joints of tarsi, which are more or less blackish ; wings hyaline, irridescent ; nervures and stigma black, a spot in centre of second submarginal cell, lanceolate cell without crossline, two middle cells in posterior wings.

Abdomen long, flattened, sides parallel ; segments 2 to 5 of tergum with the apical margin narrowly pale rufous.

Described from two specimens captured in May.

6. TENTHREDO SEMICORNIS.—♂. Black, abdomen and legs partly rufous ; length 0.40 inch ; expanse of wings 0.85 inch.

Head wider than thorax, excavated in front, with a strong ridge above each antenna ; clypeus, labrum and base of mandibles white ; antennæ moderately stout and about as long as the abdomen ; five basal joints black (the third with a narrow rufous ring at base), four terminal joints white, except the extreme apex of last which is black.

Thorax black, except a white spot on flanks, a larger one above the posterior coxæ, and another on lateral margins of the basal plates ; wings hyaline, stigma and nervures blackish ; tegulæ and base of costa rufous ; legs ferrugineous, anterior pair paler ; coxæ and trochanters partly white with base black ; a line on femora above, a spot at apex of tibiæ within, and posterior tarsi, except last joint and base of first, black.

Abdomen black at base and apex ; segments 3 to 6 rufous, margined with black ; ventre rufous except two apical segments.

Described from a single specimen captured in the city on 9th June, 1886, by Mr. J. A. Guignard. This species has the appearance of *rufopediba* Nort., with the antennæ of *grandis* Nort., by which it may be easily recognized.

7. TENTHREDOPSIS EVANSII.—♀. Yellow, with black and green markings ; length 0.45 inch ; breadth of wings 0.90 inch.

Head yellow, except an oval black spot surrounding the ocelli, within this black patch are two short yellow lines, one on each side of lower ocellus ; clypeus squarely emarginate, pubescent, as also labrum which is margined with green ; mandible yellow at base, centre green and tip

black, shading to ferrugineous ; palpi greenish ; antennæ black, greenish below ; eyes bronze.

Thorax yellow, paler below ; dorsal surface black ; scutellum and post-scutellum, with four short lines before, yellow ; wings hyaline, lightly obscured in apical half ; nervures almost black, stigma and costa green ; legs variegated ; coxæ, trochanters and femora yellow, the latter with a small black dot at tip within ; tibiæ and tarsi green, with the tip of former and of each joint of latter black ; claws red.

Abdomen yellow, with a broad black dorsal band, uniform in width to terminal segment, when it is rounded and does not quite attain tip ; ventre inclining to ferrugineous, especially the terminal segments.

Described from a specimen collected at Sudbury, Ont., by Mr. John D. Evans.

I have much pleasure in naming this beautiful insect after its captor, who has made large collections at Sudbury, and added much to our knowledge of the fauna of that part of Ontario.

CORRESPONDENCE.

ARZAMA OBLIQUATA.

Dear Sir : Upon my return from London on the 29th March, there was awaiting me, through the kindness of Mr. Brehme, a parcel containing a piece of Typha stalk nine inches long, full of longitudinal burrows, indicative of larval work. In one of these I found a small sized chrysalid and a larval skin. I put the pupa in my hatching box, and the stalk out of the way for the time. On the morning of the 8th of April, sitting in my room looking vacantly at the window, my attention was aroused by observing the outline of a moth at rest on the upright centre sash. Upon close inspection it proved to be a large sized *Arzama obliquata*, in perfect condition. Had Mr. Brehme's chrysalid hatched and the moth escaped from the box? But it seemed quite too large to have come from it. I then looked in the box, and there, resting at the top, was a small sized moth, and the empty pupa case lying on the bottom. I then got the stalk and began a careful investigation, and in the very centre I found a large cavity with a quantity of fine cuttings at the bottom, the empty pupa case of my large moth, and the cast off larval skin. A natural pair at the same time.

Hamilton, April 10th, 1889. J. Alston Moffat.

BOOK NOTICE.

INSECTS INJURIOUS TO FRUITS, by William Saunders. Second editon. Philadelphia: J. B. Lippincott Company. 1 vol., 8 vo., pp. 436.

It is with great pleasure that we announce the publication of the second edition of this valuable and important work. That a new issue should be called for is a most satisfactory proof of the excellence and permanent usefulness of the book, and establishes the fact that Prof. Saunders has provided the fruit growers of North America with a standard manual upon the insect enemies they have to contend with. Six years have gone by since the issue of the first edition, and, during that time, great and steadily increasing attention has been given to the study of economic entomology, with the result that many new methods have been discovered for successfully combatting the ravages of noxious insects. The most important and useful of these the author has now embodied in his book, and has done so with very little change in the text of the work. A superficial reader would hardly notice the alterations, but we find that many have been made, and that they bring down the information given to the knowledge of the present day. As an example, we may mention the insertion among the remedies for the codling worm, of the apple and the plum curculio, the recently discovered method of spraying with a mixture of Paris green and water, which has proved so eminently successful. For the information of those of our readers who are not already familiar with the work, we may mention that the insects treated of are grouped under the name of the particular fruit that they attack, and are arranged in order according as they affect the root, trunk, branches, leaves and fruit. An illustrated life history is given of each, followed by an account of the most useful remedies that may be employed, and of any parasitic insects that assist in keeping the pest in check. Twenty of the most important fruits are dealt with, and two hundred and sixty-six noxious insects and a large number of beneficial ones are more or less fully described. The book is beautifully printed on fine paper, and illustrated with four hundred and forty admirable wood cuts. While this work is simply indispensable to the intelligent horticulturist, it is also of great value to the practical entomologist, and a most useful book to place in the hands of beginners. The young collector will find in its pages figures and descriptions of most of the insects that he meets with, and the more advanced student cannot fail to learn from it much that would otherwise escape his observation.

Mailed May 7th.

The Canadian Entomologist.

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CORRECTIONS AND ADDITIONS TO PREVIOUS PAPERS.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

The lapse of time and further observation on some of the things treated of in papers previously published in the ENTOMOLOGIST, render it desirable to make some corrections and additions.

Trogoderma ornata, Vol. XV., 91, and XVI., 37.—The treatment of this pest there detailed so completely annihilated it that it has not been seen since.

Dermestes Frischii, Vol. XVI., 37.—Seems to be successfully naturalized, since it still occurs abundantly on Brigantine Beach, and last September was found at Atlantic City. Mr. Ulke has also taken it at Washington, D. C. (Ulke MS.).

D. murinus, *l. c.*—This species, if ever imported, is not known to have established itself. There is a form of *D. nubilus* Say, with black or partly black antennæ, and a minimum of fulvous mottling on the thorax; specimens of this kind were probably before Dr. Leconte when he described his *murinus*, Pr. Acad. Nat. Sci. VII, 108; and before Dr. Jayne when writing his "Revision of the Dermestidæ."

Blaps.—The Virginia species of *Blaps*, found very abundantly at Alexandria, is *similis* Latr., as stated by Professor Riley. Another species found in Maryland by Mr. O. Lugger, is *mucronata* Latr. The comparisons and determinations were made by Dr. Horn on his recent trip to Europe.

Ceratocampa regalis, Vol. XVI., 15, 47 and 132.—I have had several favourable opportunities to observe the mode of pupation of the gigantic larvæ of this regal moth. Where it can find ground soft enough to penetrate, it always pupates under the earth, and if at a proper depth the pupa remains there in a clay cell formed around it by its own motions till it discloses in May; but if the larva does not get deep enough the pupa works to the surface and probably does not survive. Should the larva, as is

frequently the case, find no ground soft enough to bore into, it pupates wherever it may be when the change can no longer be deferred, and this occurs mostly under some leaves. Some of these exposed pupæ when collected in April will produce moths, notwithstanding the low temperature to which they must have been subjected.

Pterostichus, Vol. XVI., 73.—I there enumerated sixteen species taken in this vicinity; four others have since been discovered, and three have been transferred from *Evarthrus*, making a total of twenty-three.

P. vinctus Lec.—This species is semi-mountainous, inhabiting under stones on the sides of steep hills where the soil is moist and friable. Though not gregarious, when found several individuals may be taken in the same vicinity. Near the city, it must soon become extinct.

P. unicolor Say.—Of this rare insect I have only taken one specimen, and Mr. W. Klages took another. It must be sought for in mountainous places.

P. lachrymosus Newm.—Occurs with *adoxus*, and in about equal numbers; without care, from their great resemblance, they may easily be confused. Their future must be the same.

P. coracinus Newm.—On the south side of the Ohio, on the rugged sides of the hills yet in a primitive state, this species occurs abundantly. Certain individuals may readily be confused, some with *stygicus* and others with *relictus*, according to the greater or less development of certain characters at the base of the thorax. It is not likely to soon become extinct.

P. tartaricus Say, for form *strenuus* Lec.—Specimens were taken in the city, in June and July, at electric lights, but it did not occur to me elsewhere.

P. patruelis Dej.—This little species inhabits a small swamp, inaccessible, except for a short time during the dry season. It is found about the roots of bunches of grass. When this swamp shall have been drained, this species will probably be extinct here, since no other primitive swamp remains in this vicinity.

P. femoralis Kirby.—Three specimens of this small species were taken once, but the habitat was not observed, though probably it is the swamp mentioned above.

P. Hamiltoni is much more widely distributed than was at first known. It occurs at a distance from the city on the sides of many of the hills in

their primitive state, and I have seen specimens from Maryland, West Virginia and Eastern Ohio.

Atœnius, Vol. XVI., 189.—The species mentioned as undescribed has since been described by Dr. Horn under the name *Wenzeli*.

Epitragus arundinis, *ib.*, 190, is found abundantly in August and September, feeding on the pollen of the beech grass growing on the sandy dunes, the underground stems of which probably sustain the larvæ.

Lixus concavus, Vol. XVII., 38.—It is quite possible the bottle of cyanide of potassium, in which this beetle was placed for several days, may have contained no free hydro-cyanic acid, as the cork was airtight; therefore this proof of the longevity of the beetle is invalid.

Ips fasciatus, *ib.*, 46.—Lately the melanotic forms have occurred here in midsummer about as frequently as the fasciated. The difference in color does not appear to be either seasonal or racial. If a locality exists where either form is alone found it is unknown to me. If *melanism* depends on cold, a latitude or altitude should be reached where there would be only dark forms, and *vice versa*. The color of such of the European forms of *Ips* as I have seen appears to be more constant than in ours. The markings on *I. 4-guttatus* Linn., which appears to be the same as our *fasciatus*, only with a perceptibly finer punctation, are very uniform in the numerous specimens I have seen, consisting of a humeral spot, trilobate in form, and two roundish ones behind the middle of the elytra, either separate or united like dumb-bells, yellowish or reddish. The suggestion of Mr. T. D. A. Cockerell, of Colorado, that humidity may be a potent factor in determining the color in variable species, seems deserving of consideration.

Macrobasis unicolor, *ib.*, 48.—A nursery of young locusts (*Robinia pseud-acaciæ*), growing on a stony knoll surrounded by meadows, was almost defoliated last July by swarms of this beetle. This knoll had probably been used the previous season by the grasshoppers (*Locustidæ*) of the meadows as the grand depository for their eggs, which were undoubtedly the food of the larvæ of these beetles; and which, after disclosure, promptly, in their voracity, attacked the nearest *Leguminosa*. This species is usually classed in economic entomology as *noxious*, because it occasionally eats a few beans, etc.; but it is certainly entitled to rank among the first on the list of *beneficial*, as without its friendly aid it is greatly to be feared the grasshopper would quickly become so numerous as to seriously affect agriculture.

Piazorhinus pictus, ib., 105.—This variable species is fairly abundant here, and is beaten from various bushes, especially oak. In Florida it seems common.

Cicindela, ib., 201.—On Brigantine Beach, N. J., *C. lepida* is sometimes found with *C. hirticollis*. When at rest it is not readily seen on the white sand—its own colour—and rarely moves till in danger of being trampled on, seemingly aware of the protective colour of the sand. A collector has stated to me that where it occurs on dark ground it is exceedingly wary and difficult to capture. With the species of the main land mentioned, occur in abundance, *C. consentanea, purpurea* and *punctulata*.

Danais archippus, ib., 204—Very few individuals were seen on Brigantine in 1887 and 1888, and no larvæ of *Anth. polyphemus*, nor of *H. io* were found, though quite abundant other years.

Clœotus aphodioides, Vol. XIX., 64.—This species has been the subject of renewed observation, and the former statement of its mode of hibernation must be re-affirmed. Mr. O. Lugger (Proc. Ent. Soc., Washington, V. I., 84) sheds light on its early stages, stating that he has frequently bred these beetles from their eggs, and has found them in all stages, *in situ*, viz., under the bark of dead trees, where they found food in the decaying material: adding, that very likely the specimens found by myself did not enter the holes to hibernate, but rather had made them to leave the place of their birth. The statement of Mr. Lugger is very interesting as to the habits of the larvæ, and it is to be hoped he may make known in greater detail the form of the eggs, larvæ and pupæ, as it is, so far as I know, the only species of the *Scarab. Laparosticti* that is recorded as being lignivorous in the larval state. With decaying wood as the breeding place of the larva, any discrepancy of observation about hibernation may be readily reconciled. Mr. Lugger's timber, under the bark, was probably rotten, and there the larvæ fed, pupated, disclosed, and the beetles hibernated. My timber, under the bark, was sound, and the bark inseparable from the wood, and there was no rotten wood for the larvæ to feed on; but the base of the tree and the subterranean roots would supply this material amply. The beetles, however, could not hibernate there, and so crawled up the tree and into any available hole; this also accounts for the mud on the elytra of many.

Saperda Fayi, Vol. XX., 6.—I have further to state that some of the

larva do not return in the spring of the second year to feed on the dead wood at the entrance of their burrows, but bore on directly up or down the centre of the limb, attaining a distance of from sixteen to twenty-four inches before pupating, in which case the beetle escapes by a round hole.

S. concolor, Vol. XX., 8.—Some of the larvæ of this species, like in *S. Fayi*, bore in the centre of the limb some distance, the beetle escaping by a round hole, which, I think, is cut by itself, as one from which a beetle was crawling appeared to have been newly made.

Dicerca prolongata, Vol. XX., 65.—The statement that this species breeds in conifers, while probably correct, requires more confirmation. It has, however, been ascertained that it breeds in some species of the *Salicaceæ*. Mr. Blanchard records its occurrence in Massachusetts, in June, on the trunks of young poplars and on poplar logs *(Populus tremuloides)*. Mr. F. Bowditch took it on the same tree in the Rocky Mountains, and also on a species of willow *(Salix)*; while in the mountains of Colorado, Mr. T. D. A. Cockerell took the beetle and probably its larvæ from this same poplar, when splitting it for firewood (Ent. Month. Mag., XXIV., 232).

Myrmophilous Coleoptera, Vol. XX., 161.—The following species must be added to the list:—

Biotus formicarius (Casey, Bull. Cal. Acad. Sci., II., 8).—Occurred at Los Angeles, California. "This interesting species lives in the nests of a small, pale brown ant."—Casey. *Biotus* is a new genus in Ctenistides. A figure of the insect accompanies the description.

Ptenidium evanescens Marsh.—This species, according to Matthews, is common in America, Europe, the Canary Islands and Madeira. F. W. Maeklin in his Coleopt. Myrmecophila Fennica (No. 102), states that it is often taken, both mature and immature, in the nests of *Formica rufa*, as well as in other situations.

Limulodes paradoxus Matth.—This curious insect is described and figured in Ann. Lyc. Nat. Hist., N. Y., VIII., 409. It was first taken by Dr. Brendell in Florida, and subsequently by Mr. Ulke in New York and the District of Columbia, frequently in the nests of a yellow ant, which Dr. Leconte thought identical with the species with which *Ceophilus monilis* lives. My specimens are from Massachusetts.—Blanchard. Probably not rare. Trichopterygia (Matthews), 157.

Trichopteryx fascicularis Hbst.—Inhabits Europe and North Ameri-

ca, occurring sometimes with ants, but usually in the rejectamenta of stables, and seldom or never in rotten leaves, *l. c.*, 134. This species is a doubtful myrmophile.

Emphylus Americanus Lec. (Bul. U. S. Geol. Surv, Vol. V., No. 3, 513).—Mr. Schwarz took the type of the species in an ant's nest at Veta Pass, Col., at the altitude of 11,500 feet.

Soronia (Amphotis) Ulkei Lec.—Mr. Ulke says of this species :—" I have found it every year, early in spring, in the nests of a small black ant (*Cremastogaster lineolata* Say), and this year I collected them in numbers among *Formica rufa*. The only species in Europe—*Amphotis marginata* Fab., is said to be found on flowers. Erichson found them, however, abundantly in the nests of *Formica fuliginosa*."—Entoml. Amer., III., 78.

Hypocoprus formicetorum Mots. (Bull. Mose., 1840).—This species, described from the Kirghis Steppes in Asia, was taken by Mr. Schwarz at Fort Garland, Colorado, in an ant's nest.—*l. cit.*, 503 ; Class. of the Coleop. of N. Amer., 140.

Myrmechixenis latridioides Crotch. Occurs from Washington southwards, having been introduced with green-house plants.—Class., 140, Trans. Am. Ent. Soc., IV., 363. The habits of this species have not been recorded ; but, as the European species live in ants' nests and about green-houses, it is introduced here to direct attention to it as a probable myrmophile.

Euparia castanea Serv. Occurs in Florida, Alabama and Louisiana, in the nests of a small ant (Horn).—Tr., XIV., 87. To be commonly met with in the Southern States in the nests of *Solenopis Xylini* McC., the stinging ant of the cotton fields.—Amer. Nat., XVI., 784.

Euphoria hirtipes Horn.—This species is stated to have been found in Nebraska by Mr. Lawrence Bruner in the hills of the common red ant. It occurred quite commonly, and the larvæ were found as well as the beetles.—Amer. Nat., XVI., 748. The discovery of the larvæ of this beetle is a matter of so great interest, that the absence of all further account of them is disappointing. Maeklin states that the larvæ of *Cetonia aurata*, a near ally, are so abundant in the nests of *Formica rufa* on sandy shores, that fishermen use them commonly to bait their hooks.

Cremastochilus Knochii Lec.—This species was taken in the spring in ants' nests in Colorado by T. D. A. Cockerell, Custer County (in letter).

Hymenorus rufipes Lec.—The larvæ of this beetle were found abundantly in the nests of *Formica fusca* by Messrs. Pergande and Schwarz near Washington, D. C., and the beetles bred therefrom.—Am. Nat, XVI., 748, and XVII, 1176.

H. obscurus Say.—The larvæ of this beetle were likewise found at the same place in the nests of a large yellow ant, and, from the great care bestowed on them by the ants, it was inferred they were not there by accident.—*Ib.*, XVI., 748.

Mr. F. W. Maeklin published in 1846 his COLEOPTERA MYRMECOPHILA FENNICA, enumerating 136 species. He included such as were known to live with ants habitually; such as were found with them occasionally, but usually elsewhere, and even such as occurred in the vicinity of their nests, if of unknown habits. But the scope of the present catalogue is more limited, as stated in the introduction, and would exclude a large number of those on his list, and among them probably all of the following European-American species:—

Bembidium 4-maculatum Linn.—Dr. Sahlberg took at Ylæne a single individual with *F. rufa*. This species requires no further notice.

Tachyporus brunneus Fab —Occurred once at Urpala in the society of *F. fuliginosa*. This species is exceedingly abundant here in early spring under stones and chips; sometimes an ant's nest is found under the same stone with the beetle, but I never discovered any connection between them, except the stone.

T. scitulus Er.—Taken not rarely in the nests of *F. rufa*. I only know this species at secondhand, having obtained it from Mr. Dury, of Cincinnati. Its habits in this country have not been noted.

Tachinus pallipes Grav.—Occurred once at Urpala among *F. fuliginosa*. *Pallipes* is very common here, and is simply a scavenger beetle.

Conosoma pubescens Payk.—Found occasionally in the nests of *F. rufa*. This species is abundant here under the bark about the base of dead trees and stumps; as ants also frequently make their nests in the same place, their being often found together is to be expected, but this does not make the species a myrmophile.

Ptenidium evanescens Marsh.—This species I include in my list doubtfully.

Meligethes æneus Fab. (*Brassicæ* Scop.).—Found rarely at Kavantholm in the nests of *F. rufa* by Mannerheim. In our country this species

occurs on the Pacific slope and in the Rocky Mountains, and I am unwilling to admit it in my list without further proof.

Cyphon padi Linn.—Taken rarely in the nests of *F. rufa* at Kavantholm, Kirjola and Urpala. It is not known as a myrmophile in this country.

Otiorhynchus maurus Gyll.—Maeklin occasionally took this species in the nests of *F. rufa* at Kirjola. In America this species is known to occur only in Greenland, and its habits are entirely unknown.

Leptura, Vol. XXI., 32.—While this article was in press, Dr. Geo. H. Horn published in the Tr. Am. Ent. Soc. a new arrangement of the *Leptura* therein named, based on an examination and study of the types in the British Museum. The form I mentioned as being undescribed turned out to be really *nana*, and now *hæmatites* is regarded as its varietal synonym. The typical *nana* is thus described :—"Antennæ always piceous; anterior femora and base of middle yellowish, many specimens, however, occur with brown legs, and others with parts of the hind legs yellowish." Except these two the other forms remain as before.

Erratum—Page 33, line 18, read female, instead of male.

ADDITIONS TO THE LIST OF CANADIAN COLEOPTERA.

BY ALVA H. KILMAN, RIDGEWAY, ONT.

By frequent trips to the woods and marshes in spring, to gather and sift the moss for hibernating coleoptera, by minutely examining the debris on the shore of Lake Erie, and by the use of umbrella and sweeping net later in the season, I have added to my collection of beetles, since 1886, several hundred good species. The following list contains those of my captures that do not appear in the lists of Canadian Coleoptera.

The species marked with an * are recorded by W. Hague Harrington in his additions to Canadian Coleoptera, published in Vol. XVI., page 44 of this journal. Those distinguished by two ** are named in Prof. J. T. Bell's list of Staphylinidæ, taken at Belleville, vide Vol. XVII., page 49 of this Journal. All the others, as far as I can learn, are quite new to Canada. For convenience of reference, I attach the numbers found in Henshaw's List of North American Coleoptera.

To Mr. Henry Ulke, of Washington, I am indebted for correct determinations. Dr. John Hamilton, of Allegheny, also kindly assisted me.

Upon such authority, it will be safe to credit the insect fauna of Canada as follows:

155—*Elaphrus fuliginosus* Say. Rare, with *Elaphrus Clairvillei* Kirby, hibernating under moss in low woods. March to May.

269—**Clivina Americana* Dej. On lake shore.

285—*Schizogenius ferrugineus* Putz. Very rare; one specimen in the sand on lake shore.

300—*Nomius pygmæus* Dej. Muskoka. August.

372—*Bembidium arcuatum* Lec. Rare in moss.

580—*Pterostichus Pennsylvanicus* Lec. Found hibernating in the clay of moss-covered banks in low woods; not rare. April.

741—*Badister reflexus* Lec. Not common in moss.

784—*Platynus pusillus* Lec. Rare; found two specimens on a decayed log. May.

792—**Platynus propinquus* G. & H. Rare; hibernates in decayed wood.

1150—*Acupalpus carus* Lec.

1165—*Tachycellus Kirbyi* Horn. Common in moss.

1186—*Anisodactylus interpunctatus* Kirby.

1262—*Desmopachria convexa* Aubé. Not common.

1434—*Agabus subfuscatus* Sharp. Rare in clear water.

1818—*Scydmænus mariæ* Lec.

1920—*Bryaxis dentata* Say.

2096—***Heterothops fumigatus* Lec.

2102—*Quedius peregrinus* Grav.

2199—*Philonthus æqualis* Horn. Common.

2221—*Philonthus nigritulus.* Quite common.

2236—*Actobius nanus* Horn.

2237—*Actobius inutilis* Horn.

2243—*Actobius sobrinus* Er.

These species of *Actobius* are found in moss on the ground in wet places of the low woods. April and May.

2337—*Stenus indigens* Casey.

2364—*Stenus pusio* Casey.

2377—*Stenus mammops* Casey.

2384—*Stenus egenus* Er.
2391—*Stenus canaliculatus* Gyll
2398—*Stenus parallelus* Casey.
2463—*Stenus punctatus* Er.

The *Steni* are to be found in sphagnum and other mosses at any time of the year, but especially in early spring. The same may be said of nearly all the Staphylinidæ here named.

2527—***Lathrobium tenue* Lec.
2530—***Lathrobium debile* Lec.
2548—*Scopæus dentiger* Lec.
2562—***Lithocharis obsoleta* Nordm.
2675—***Mycetoporus flavicollis* Lec.
2724—*Bledius nitidicollis* Lec.
2757—*Oxytelus nitidulus* Grav.
2948—*Trichopteryx sericans* Heer.
2978—*Bœocera concolor* Fab.
2983—*Scaphisoma suturale* Lec.
3017—*Sacium lunatum* Lec. Found on dead twigs of apple. June.
3234—*Tritoma festiva* Lac. Three specimens on decaying beech tree. June.
3235—*Tritoma macra* Lec. Rare ; beaten from decaying tree trunk.
3244—*Synchita laticollis* Lec. One specimen from dead wood.
3326—**Læmophlæus convexulus* Lec. Two on dead apple twigs.

(To be continued.)

CATCHING BUTTERFLIES BY MEANS OF DECOYS.

BY SHELLEY W. DENTON, WELLESLEY, MASS.

It has long been a matter of fact to me, and one which has served a good purpose, and doubtless to other readers of the CAN. ENT., that many butterflies, especially the larger kinds, are attracted by decoys resembling themselves in size and colour.

So many incidents of this nature have crowded themselves upon my notice, that I trust it will not be considered presuming on my part to enumerate a few of them, and at the same time state the benefits to the butterfly hunter which may arise from this source.

My attention was first called to this fact some fifteen years ago, while collecting in the neighborhood of Boston. I caught one day an example of *Papilio turnus*. After taking the insect from my net, and while holding it in my fingers, preparatory to placing in my collecting box, another butterfly of the same kind darted down at the one I held and fluttered above it for a moment, as if to entice it away. I was so surprised that no attempt was made to capture the visitor until he had risen beyond reach. Expanding and placing on a bush close by, the almost lifeless butterfly which I had held in my fingers, and partially concealing myself, I awaited the insect's return; nor was I disappointed or obliged to wait long. I could catch an occasional glimpse through the bushes of my intended victim: nearer it came, till hovering for a moment above my decoy, was easily secured. This plan was followed during the rest of that day, and more or less since that time, with gratifying results; having caught as many as thirty-seven *Papilio turnus* in a day, and that, too, in a place like Eastern Massachusetts, where they are, so far as my experience goes, not very common.

While in Nevada, in the summer of 1887, this method was followed with good success in the capture of *Papilio rutulus*, *eurymedon*, and *daunus; Argynnis leto*, *nevadensis*, and *coronis; Limenitis lorquini*, and others. I found a piece of bright yellow paper, cut out to resemble *P. rutulus*, proved almost as attractive as a butterfly of that species, and even a yellow leaf, which I picked up and placed in a conspicuous spot, answered the purpose very well once, to enable me to secure a decoy.

I find the best place to expose a decoy is in some sunny nook, where an occasional specimen of the species of which you are in search is seen, allowing the full rays of the sun (provided your decoy is a butterfly) to strike on the expanded wings. It is usually my custom to cut down the green bushes, except, perhaps, one in the centre of the opening, and stripping the leaves from the tallest sprig or branch, place my decoy on the point. The decoy may be a badly damaged specimen—one not fit to preserve.

This method applies best to the larger and stronger flying species of butterflies, and these are the ones the hunter has the greatest difficulty in procuring, especially if the country is rough and broken, so he is restricted in his movements by deep gullies, cliffs, or large, loose rocks. Occasionally the hunter will have an enemy in the shape of a large dragon

fly, which will pounce on the coming prize just as you are about to " scoop " it in; then away the two will go. The butterfly soaring and flapping often till almost out of sight, in the vain endeavour to rid itself of the enemy which has taken such a death-like grip upon it, but this shark of the air is in the end generally victorious.

In some countries, such as Australia and New Guinea—and I speak of these because of personal knowledge—there are large and showy butterflies of very powerful flight, which are almost impossible to catch on the wing, not only being shy, but high-fliers; and I know of no way in which they can be taken so readily as by the method above described. I refer particularly just now to that large and magnificent blue butterfly (*Papilio Joësa*) which in Northern Queensland may be seen alighting on or floating above the tops of the forest trees, occasionally flashing in the sunlight like a star of unusual brilliancy. It is a magnificent sight to a butterfly hunter, and one that will fill him with enthusiasm, but one likely to be of great disappointment should he wait for it to come within reach or settle near the ground, where it could be taken with his net; for nine times out of ten, when it takes flight, it will sail around and away over the tops of the trees till lost from view, unless you have something to catch its eye and cause it to descend from its elevated position. Now, procure one of the same species and place it in a conspicuous place in the sunlight; conceal yourself near by, but be ready to strike at a moment's notice, and await the result. Your decoy will most likely soon be seen (for it is wonderful how quickly a butterfly will discern one of its own kind), and down will come the longed-for prize, to your delight and satisfaction; but you must sweep with your net at just the right time, or the opportunity is lost. But perhaps you ask how is the first specimen or decoy to be obtained? This is often a matter of considerable difficulty. I was accustomed when rambling in the forests of that country to carry a gun, and although when obtained by shooting they were generally in a rather dilapidated condition, yet they served the purpose of a decoy very well.

One thing which has always surprised me, is the remarkable sight and, perhaps, sense of smell which some insects seem to possess. Often while having a decoy exposed, I have been startled by the sudden appearance of a butterfly when none were apparently in the neighborhood. The causes which lead to the attractiveness of decoys no doubt are various. Possibly the passing butterfly on seeing the decoy, supposes the latter

has found an abundance of suitable food. But my opinion is, that in the majority of cases it is a matter of sexual importance, and but for this powerful influence which causes them to seek each other, and thereby propagate their species, these most beautiful objects of nature would eventually die out.

NOTES ON THE PREPARATORY STAGES OF CARTEROCEPHALUS MANDAN.

BY JAMES FLETCHER, OTTAWA.

Amongst some fertile eggs of butterflies obtained during the past summer by gently pressing the abdomen of ripe females, was one of the above species, the larva of which was carried through four moults up to hibernation. The information gathered is incomplete; but as there is nothing published concerning the preparatory stages of *C. Mandan*, it seems worth recording, if only to assist others who may be fortunate enough to secure eggs of this rare butterfly. Although widely distributed over North America, I know of no locality where it is abundant. Females taken at Nepigon in the Lake Superior district laid eggs in confinement upon common lawn grass *(Poa pratensis)*.

The following description is drawn from one specimen only for the last two stages, but from three for the first three stages :—

Egg.—Pale greenish white, hemispherical, broader than high, apparently smooth, but when magnified found to be very faintly and vertically grooved or wrinkled, and densely and uniformly pitted with deep pores which are wide at the mouth and taper to a fine point. Eggs laid 13th July, hatched 23rd.

Larva.—At birth. Length 2.5 mm. Breadth of head, .45 mm.; of body, .35 mm. Length of bristles, .05 mm. Yellowish white, with head and thoracic shield black. Head large and smooth. Body slender, equal. Thoracic shield narrow and bearing a few slender hairs. Body bearing on each side four series of trumpet-shaped bristles. Duration of first stage five days.

From the very first these larvæ were great wanderers, frequently leaving their food plant and crawling all over the glass lamp chimney which was used as a cage. In these wanderings they spun silken paths wherever they went, and to prevent their escape a plug of cotton wadding was

kept in the top of the chimney. This habit of wandering was kept up through all the stages, and the inside of the glass was covered with their silken paths. At no time, however, did they construct a tent by catching several leaves together in the manner of the larvae of *P. Mystic*, *P. Cernes* and *P. Manitoba*. Directly after they hatched, the young larvæ climbed up to the tops of the blades of grass and made a sort of tent by catching the opposite edges together with two or three cords of silk, about half-an-inch below the tip. They then attacked the edges of the leaf, eating down each side and leaving the midrib. When at rest, during the first three stages, they retired beneath their tents and lay extended along the midrib. After the third moult they would sometimes roll the leaf of a wide species of grass, as *Panicum crus-galli*, into a tube similar to those made by *P. Hobomok*. After the fourth moult no tent was made, the larvæ lying exposed on the upper surface of the leaves when at rest.

After First Moult.—Length, 3.5 mm. Head white and furrowed at apex. Thoracic shield black, much smaller than in first stage. Body pale green with two narrow white lines on each side—one sub-dorsal, the other supra-lateral. Spiracles yellowish. Whole body covered with a minute pubescence. Duration of this stage five days.

After Second Moult.—Length, 6.5 mm. Head rather higher than broad, slightly broadest at the base, rounded at apex, and bilobed by reason of a deep frontal groove; mandibles and two clouds on the cheeks, fuscous. Thoracic shield, transparent and hardly discernible. Body pale green and translucent, the dorsal vessel and the ramifications of the tracheæ showing plainly through the transparent skin. There are, on each side, a pale sub-dorsal band with irregular edges, a distinct clear white supra-lateral stripe, and a very faint supra-stigmatal line. The sub-dorsal bands unite on the anterior fold in the anal segment. The supra-lateral stripes at the end of the anal flap. Duration of stage seven days.

After Third Moult.—Length, half an inch. Head lighter in colour, without the fuscous marks on the cheeks. Of the same size as the cylindrical body. Colour more glaucous green than in previous stages. Duration fifteen days.

After Fourth Moult.—Length six-eighths of an inch. Head greenish, tinged with yellow, a little larger than second and last segments, but smaller than the rest of the body. Head squared at the base, rounded at the apex, and deeply grooved down the front. Width at the base and the

height about equal. Surface minutely roughened. Ocelli black, arranged in a semi-circle following the contour of the face, four in front and two on lower side. The third and fourth are twice the size of the others. Mandibles white with black tips. Thoracic shield not distinguishable. Body glaucous green with a pale sub-dorsal band, clearly defined with white above, much paler below, leaving a distinct green dorsal stripe. Supra-lateral stripe conspicuous, creamy white and clearly defined; not so wide as the pale sub-dorsal band. Below this, and half way to the spiracles, is a very pale thread-like supra-stigmatal line. Spiracles white, very inconspicuous on a thread-like line, or perhaps this may only be the tracheæ showing through the skin. On segments three and four (counting the head as No. 1) there appear to be beneath the transparent skin, instead of spiracles, knots of tracheæ. Whole body, including the head, minutely shagreened and covered with small piliferous papillæ, which, on segments two, three and four, are black at the base of the hairs. The segmental folds of the body of the mature larva are as follows:— Segment two, transversely grooved; segment 3, three equal folds; segment 4, four small folds; segments 5 to 11 consist of five folds, the anterior twice the width of the second, which, again, is twice the width of each of the other three; segment 12, three equal folds; segment 13, two small folds and the anal flap.

Some interesting epidermal organs, first observed upon this species, but since found on the larvæ of other Pamphilidæ, as well as on the pupa of *P. Cernes*, (the only pupa I have examined) are some small round chitinous disks, which appear to be trichomes or modified hairs. I form this conclusion from finding that, in one species, there occurred in two instances, instead of these disks, piliferous tubercles; they are rather small and difficult to examine. In the larva of *C. Mandan*, they appear to be saucer-shaped, having a raised edge. In the larva of a species of Pamphila, near to *Manitoba*, they are, in some instances, simple annuli; but, in *P. Cernes* and *P. Mystic*, seem to be rather cone-shaped.

Upon the larva of *C. Mandan*, they are arranged in three lateral series, two of which are complete and occur on all the segments except the head, and the other ventral and incomplete, occurring only on segments five, six and eleven.

The first series is placed above, and anterior to the spiracles, and the disks are sometimes double upon the abdominal segments; but they are not always uniform on the opposite sides of the body. In the specimen

most carefully examined, they were double on segments eight, nine, ten and twelve upon one side, but only on eight and nine on the other, and on segment five there was no disk of this series on one side, but it was present on the other. On segments two, three and four, they are on supra-stigmatal line. On segments five to twelve, below supra-stigmatal line. On segment thirteen on supra-lateral stripe, larger than the others.

The second series is single throughout, posterior to the spiracles, except on segments two, three and four, where they are slightly anterior on the fold above the thoracic feet. The third, ventral, series occurs only on segments five, six and eleven, just beneath the stigmatal fold.

The shape of the larva when mature was different from that of the first stages, the body being largest in the middle and tapering off to each end. The full-grown larva measured one inch and one-eighth on September 12 (twelve days after the last moult). After this, it fed sparingly for about two weeks, and then spun a mat of silk on the face of a blade of grass and drew two other blades over it with single strands of silk. The furrow down the face deepened and appeared to open a little, and I felt sure pupation was going to take place. This, however, was not the case, and two days later the larva left the grass and spun another mat on the sloping side of the lamp chimney. It now ceased to eat, and the colour changed gradually, all the green fading out, and in ten days the body was of a yellowish cream colour with white stripes. This again darkened until the ground colour was a very pale brown or dove colour. The moisture which condensed on the side of the glass kept the lower part of the larva's body constantly wet; but I did not like to risk removing it, as I looked for pupation at any day. After remaining still, and evidently, in hibernation for about five weeks, I found it had fallen from its mat to the ground on 29th October. After about a fortnight discoloured spots began to appear, and I found it was dead. It was at once put into alcohol for preservation and examination.

These larvæ fed freely on all grasses offered to them, but seemed to prefer wide-leaved species; this, however, may have been an instinctive preference for protection, both from the shape of their bodies and the coloration, added to a habit of lying extended down the midrib with the body closely appressed, the lower part of the head protruded, and the apex drawn back, these larvæ are well hidden from observation. The favourite grasses were *Panicum crusgalli*, *P. sanguinale* and *Triticum repens*.

POPULAR AND ECONOMIC ENTOMOLOGY—No. 3.

CUT-WORMS.

BY JAMES FLETCHER, OTTAWA.

Of all the injuries committed year after year upon field and garden crops, none are more annoying than those due to the ravages of the various caterpillars known as Cut-worms. These are the larvæ of dull-coloured, active moths, belonging for the most part to the three genera, *Agrotis*, *Hadena*, and *Mamestra*, and in North America alone constitute an army of no less than 340 different described species, many of which are, at times, very abundant. They may be described, in a general way, as smooth, almost naked, greasy-looking caterpillars, of some dull shade of colour similar to the ground in which they hide during the day. The head is smooth and shining, and sometimes of a different colour from the rest of the body. On the segment next to the head is a smooth plate, known as the thoracic shield, and there are three or four series of bristle-bearing tubercles along the sides. Their habits are nocturnal, that is, they feed at night and lie hid during the day-time. The habits of most cut-worms are as follows:—The eggs are laid in spring, summer, or autumn, and the insects pass the winter either in the perfect moth state, as a half-grown caterpillar, or as a chrysalis. Those which hibernate as moths, lay eggs in the spring and moths are produced in the autumn. The eggs which are laid in summer and autumn hatch soon after, and the caterpillars either become full fed the same season and pass the winter underground in the chrysalis state, or, after feeding for a short time, become torpid, and so pass the winter beneath stones, heaps of dead vegetation, or in cells beneath the surface of the ground. The injury done by the young caterpillars in the summer and autumn is seldom noticed at those seasons, on account of the abundant vegetation; but, in the spring, not only are the caterpillars larger and capable of more mischief, but the land is cleared of all vegetation other than the crop which is to be grown. They are then particularly troublesome in gardens, cutting off young cabbages, tomatoes, and other plants as soon as they are pricked out. When full fed, these caterpillars burrow into the ground to a depth of some inches and turn to brown chrysalids inside a smooth cell or a light

cocoon, Fig. 3. From these, after a few weeks, the perfect moths emerge. They are very active at night, and, when disturbed, have a habit of dropping to the ground and remaining perfectly still as if dead, where, from their dull colours, they are difficult to detect. When at rest, their wings lie horizontally over their backs, and the upper ones entirely cover the lower pair The upper wings are generally crossed with one or more waved lines, and always bear two characteristic marks—one about half way down the wing, orbicular in shape ; the other nearer the tip, reniform or kidney shaped. Fig. 4 shows "The Gothic Dart Moth" (*Agrotis subgothica*, Haw.,) with wings closed and expanded ; this is a very common and injurious species, the caterpillar of which is too well known as the "Dingy Cut-worm."

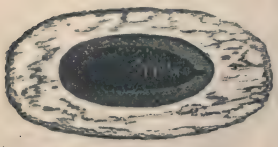

Fig. 3—Cocoon.

Fig. 4—Gothic Dart Moth.

Cut-worms may be divided into three classes, according to their habits, and remedies must be applied in a slightly different manner for each. These classes are :—

1. Climbing Cut-worms, or those which climb trees and destroy the buds.

2. Surface Cut-worms, or those which live on the surface of the ground and cut off herbaceous plants just beneath the surface of the soil.

3. Those which combine both of these habits.

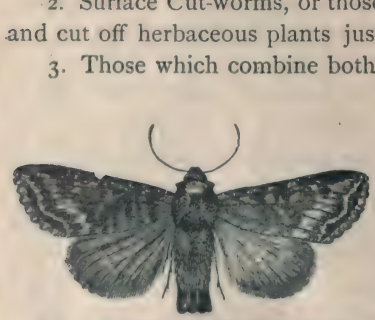

Fig. 5—Amputating Brocade Moth.

Of the first class, a good representative is the Climbing Cut-worm (*Agrotis scandens*, Riley). The Dingy Cut-worm, the caterpillar of the Gothic Dart Moth (Fig. 4), belongs to the second class, and the "Variegated Cut-worm" (*Agrotis saucia* Treit.), and the "Yellow-headed Cut-worm," which turns to the "Amputating Brocade Moth" (*Hadena arctica* Bois.) (Fig. 5) are good representations of the third class.

Remedies.—There are several remedies which may be used for cut-worms. For the climbing kinds, the best remedy is to place round the stem of the tree or bush to be protected, a strip of tin four inches wide, the lower edge can be pressed into the ground, and the tubular shape is easily preserved by securing it above with a piece of twine. This will effectually keep all cut-worms from the tree, for these heavy-bodied caterpillars are unable to crawl over the smooth surface. A similar expedient is to tie a band of cotton batting around the stem, as the caterpillars cannot crawl over this yielding material.

For surface cut-worms the most efficient remedies are the following:—

1. Keeping down all weeds in late summer and autumn, so as to deprive those species which hatch in the autumn of their food supply and winter shelter.

2. Burning off all the stubble and rubbish as late as possible in spring, when many caterpillars and the eggs of some species will be destroyed.

3. Placing some substance with an obnoxious odour around young plants when first set out, as fresh gas-lime, or sand or sawdust saturated with coal oil or carbolic acid.

Fig. 6—Fiery Ground Beetle.

4. Wrapping. Young plants may be protected in a large measure by simply wrapping a piece of paper around the stems at the time of planting.

5. Tomato cans with the tops and bottoms cut out, placed over the young plants, or strips of tin as suggested for Climbing Cut-worms, will be found to well repay the trouble and expense of procuring them.

6. Kerosene emulsions. Where these caterpillars occur in very large numbers, spraying infested beds with a kerosene emulsion at night has been found very beneficial.

7. Traps. Placing bundles of leaves or grass, poisoned with Paris green, between the rows of infested beds has been found a useful means of destroying large numbers of these pests.

8. Hand picking. When a plant is seen to have been eaten off, of course the cut-worm should always be looked for and destroyed. They will generally be found close to the root and about an inch beneath the surface.

In addition to the above artificial remedies, nature has provided the

farmer with many useful and active assistants in the shape of various predaceous insects. Conspicuous amongst these are the Ground Beetles, which should be known by sight by every one, so that they may be protected, and not, as is too often the case, destroyed *because they are insects.* At Fig. 6 is shown the "Fiery Ground Beetle" *(Calosoma calidum* Fab.), a common and very useful species. Its colour is deep black with red (or sometimes green) glowing spots. The grub has been styled the "Cut-worm Lion," on account of its useful habit of destroying these pests.

CORRESPONDENCE.

AN EARLY BUTTERFLY.

Dear Sir: While driving in a cutter on 12th March, my attention was attracted to a butterfly fluttering around a farmer's house. Seeing it alight, I attempted to capture it, but although I got near enough to make sure it belonged to the genus *Grapta*, it rapidly flew across a wide field of deep snow and easily eluded pursuit. The weather was mild, and as far as my experience goes, this species is the earliest butterfly to appear in our vicinity; but I consider this particular record as somewhat remarkable even for *Grapta.*

Plover Mills, Ont. ROBERT ELLIOTT.

CAPTURES AT MONTREAL.

Dear Sir: During the past summer a few butterflies have been taken here which are perhaps worth noting. I took a *Pieris napi oleracea* on May 21, and half a dozen *Pyrameis huntera* and two *P. cardui* one afternoon in September. *Oleracea* is very local and has almost disappeared. *Huntera* is very rare, one or two specimens perhaps being observed each year, and *cardui* has been scarce since 1884, when the species appeared in great abundance. A specimen of *Feniseca Tarquinius* was taken in June and two in July of the previous year (1887). These are the only instances of its occurrence here.

E. C. TRENHOLME, Montreal.

Mailed June 5th.

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THE NOCTUIDÆ OF NORTH AMERICA AND EUROPE.

(First Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

We have seen in several of my previous papers that the Owlet Moths, or *Noctuidæ* of temperate North America, the United States and Canada, resemble most strongly those of Europe. The divergence lies chiefly in the greater number of species belonging to the *Noctuidæ fasciatæ*, or *Catocalinæ*; and this is a tropical feature, such forms becoming more plentiful as we go southward, although *Catocala*, the typical genus of the group, does not seem to cross the equator, to which latter fact I have already called attention. Forms allied to *Pheocyma (Homoptera)* and belonging to this group, intrude into the European fauna, on the coasts of the Mediterranean. From the fact that the Southern States reach into the sub-tropics, the mountain chains forming no cross barriers, there is no impediment to the range of southern moths, and a greater number of species and genera of these extend into Canada and the north. The resemblance between the *Noctuinæ*, or *Noctuæ nonfasciatæ* of Europe and North America, can be traced in that the leading European genera are represented with us, and the species are even more numerous. Such leading genera, about which genera of less importance cluster, are *Apatela (Acronycta)*, *Agrotis*, *Hadena*, *Mamestra*, *Heliothis*, *Eustrotia (Erastria*, Tr. non Hübn). The genus *Catocala* has in North America its metropolis, where the number of forms, species and varieties reaches its maximum. The fact that the forms run very close seems to illustrate the observation that in the North-American fauna there exists an evident tendency to the differentiation, or throwing off of species. Instances of this may be cited in the Lepidoptera, in the genera *Argynnis*, *Colias*, *Papilio*, *Hemaris*, *Callimorpha*, *Datana*, *Clisiocampa*, *Scopelosoma*, among many others. As compared with the North-American species of

Catocala, the European are fewer in number and comparatively better marked and distinct, standing farther apart from each other. The hardening process by which each species becomes more isolated in time, seems to have reached a more final stage with the European species of *Catocala*, etc. I have orginally compared the European *C. fraxini*, with the North-American *C. relicta*. I found differences in size and color between the two "representative" species, on the whole so slight as to warrant the belief that the two were derived from a common ancestral stock. We must seek for this ancestral stock in the tertiary, when its range probably extended over Northern or British America, and Siberia. A character which is distinctive of the present European species, is the dull blue median band of the secondaries. Now, I found, and first recorded the fact, that, in certain examples of the American form which has the band white, a faint blue edging to the band was found. This was a reversion to the original color in all probability. The tendency of color to become brighter and lighter in America, owing probably to atmospheric or climatic conditions, is thereby exemplified. The specimens of *C. relicta*, which have the forewings dusky, are also probably instances of this reversion. A form belonging to this group of the genus has been also described from California. It is doubtful, as yet, whether this can be considered a distinct species. The variation of the North-American forms has led to the publication of a number of names which, in some instances at least, are not properly founded. This "hardening into species" seems to be a natural process by which we may conceive the forms to become gradually more peculiar, different from their surrounding allies. At length the time may arrive when they disappear by extirpation, having given rise themselves to other species, through variation, their species-offspring surviving them.

From a classificatory point of view, the genus *Catocala* can hardly be held as "typical" of the *Noctuæ fasciatæ*, the more geometriform group of the family. Rather is *Pheocyma (Homoptera)* to be thus considered; the wings are unicolorous, and the darker rivulous markings extend over both pairs, while the secondaries are more or less exposed in repose. In *Catocala* they are hidden, and Lederer sees no necessity for any sub-family division. Probably the terms are to be used strictly for the convenience of students. The tibiæ are often spinose in these wide-winged genera, and this character, not unusual in the family, the *Catocalinæ* have in com-

mon with the typical group of the *Noctuidæ*, where we see it in *Agrotis*, and a number of separated genera of smaller extent. This spinosity of the tibiæ is not frequent in the *Bombycidæ*, or in the *Geometridæ*; it is not so far apparent in the lowest group of the Owlet Moths, the *Deltoidinæ*. In the *Catocalinæ*, however, the body tends to become untufted and concolorous, the abdomen tapers to the tip, and the resemblance to the *Geometridæ* is further heightened by the looping larvæ.

Either from actual structural characters, or from the peculiar *form*, or as a matter finally of pure convenience for the student, I have divided the Noctuidæ into five sub-families: the *Thyatirinæ*, the *Noctuidæ*, the *Catocalinæ*, the *Deltoidinæ*, the *Brephinæ*. All these grounds for subdivision are recognized by modern systematists. The divisional terms help, as I have elsewhere said, to light up the group to enable us to compare the representation of the family in different quarters of the globe, and to arrive at conclusions relative to distribution and origin. For, on common sense grounds, I object to a classification absolutely technical and rigid; so rigid as to take no note of the plasticity of the forms, and so ignorant of the process by which a spine or a tuft is formed, as to be unable to determine categorically what characters are most difficult, or take more time to be produced in nature. The value of characters for systematic purposes may, therefore, stand in opposition to their biological value. A reasonable entomologist will therefore take note of *all* the facts presented, and will make his categories correspond, so far as possible, with the total qualities of the creatures he proposes to classify. The bare record of structure, and the erection of an artificial nomenclature is the smallest part of a naturalist's work. The thinking mind will discover the bearing of facts upon each other, and educe therefrom the action of natural law.

1.—Sub-family *Thyatirinæ*.

With the exception of *Pseudothyatira* and *Leptina* the generic representation of this group, which differs by the position of vein seven of the secondaries, is the same in Europe and North America. The former we may regard as a modification of *Habrosyne*, while the latter seems more removed from the different European generic groups allied to *Bombycia* (*Cymatophora* of Authors non Hübn). North America has one; Europe another, and Japan a third species of *Habrosyne*, so closely allied that they may be considered as geographical or representative species. These

species run much closer together than the species of *Thyatira*; in the size, the characteristic wavy markings, they are nearly alike. Although, the European species of *Thyatira* is sufficiently distinct from *Bombycia (Cymatophora)*, so that the ground for these genera being placed together is not obvious until we compare the neuration of the secondaries, the American western representatives approach each other more nearly in external characters. Of the two genera, it is *Habrosyne (Gonophora)* which is most aberrant, most like the typical Noctuae, most like the genus *Plusia*. And I would here record a most singular fact: older European writers, as Meigen, etc., place *Thyatira* near *Plusia*. Probably the cut of the wing in *derasa*, and the tufts, together with the bright tints of both *batis* and *derasa*, influenced their decision. But there are no special resemblances between the species of *Plusia* and *Thyatira* in the European fauna. Now, in North America, we have two species of *Plusia*, which actually mimic species of *Leptina* and *Thyatira*. The first of these is *Plusia formosa* Gr., which so closely resembles a *Leptina* that, at the commencement of my studies, I described the type under this genus. I had my doubts, owing to the long *Plusia*-like labial palpi, to which I especially alluded. It so happened, that I at once returned the type to Mr. Treat, while I never afterwards saw a specimen, owing in part to the undoubted rarity of the species. I could not myself then subsequently make the correction, which was supplied by the late Mr. Morrison, (who was largely indebted to me for generic and specific determinations in the *Noctuidæ,)* in the Annals of the N. Y. Lyceum of Natural History. The second instance, as its name implies, is the *Plusia thyatiroides* of Guenèe, which, in its rosy patches on primaries, reminds one of *T. pudens*. Had these two forms occurred in Europe, they might have strengthened, or of themselves suggested the opinion that *Thyatira* and *Plusia* were allied. As it is, the case is one of the most singular which I have met with in the moths. It is to Hübner that we owe the more correct classification of this group. How much we do owe to this author! This fact alone, and that he has correctly limited the genera, should oblige us to retain Hübner's nomenclature in this sub-family. Writers, who themselves make mistakes in describing structure, should be more modest in their criticisms of Hübner.

The various genera into which the typical European forms are divided by Hübner, are probably valid: *Bombycia*, *Asphalia*, etc. As against

the two European species of *Bombycia, or* and *ocularis*, we have two from the west coast, *improvisa* Hy. Ed., and *semicircularis* Gr. But the other European structural types seem to be wanting with us ; *Leptina* seems to be quite distinct from these, and an American outgrowth. The species described by Walker from the east, under *Cymatophora*, I have partly examined, and have corrected his generic determination, so that it seems unlikely that we have any eastern representative of the European genera. It would seem to be a proof that the west coast fauna more nearly coincides structurally with the European, that the typical European genus of this sub-family, *Bombycia (Cymatophora)*, occurs there, and not in the east of North America. There seems to be, finally, some doubt as to what the west coast species of *Habrosyne* really is ; whether our eastern *scripta*, which is rather unlikely, or a form identical with the European, which Mr. Hy. Edwards has suggested. While the species of *Pseudothyatira* seems to extend nearly, if not quite, across the Continent, our eastern *T. pudens* Guen. appears to be replaced on the west coast by *T. lorata* Grote. But I have seen no record of this species from California.

We may believe that the peculiar resemblance of the Californian and west coast fauna to that of Europe, has arisen partly in the fact that the preglacial fauna forced downwards during the Ice Age, has been on the west confined to a comparatively narrow strip between the Rocky Mountains and the Pacific Ocean, and that it has been exposed to lesser variation from migration. The temperature and food-plants necessary to many species are contained in narrower belts, with probably more abrupt confines, precluding the range of the species. Thus the original form may have been longer preserved.

I may conclude that this sub-family must be regarded as belonging to the Northern Hemisphere, and its representation in the New and Old World, as derived from a former circumpolar fauna. While certain generic forms found in Europe (at least two in number: the hairy-eyed *Asphalia*, and the naked-eyed genus of which *duplaris* is the type), do not apparently occur in America, we have, as an offset, the species of *Leptina*. We have also, in the more aberrant group of the sub-family, the peculiar genus *Pseudothyatira*, with its one species appearing in two forms, *cymatophoroides* and *expultrix*. On the whole, then, the representation of the *Thyatirinæ*, though probably without coincident species, is quite nearly equal in the New and Old World. For, if we have a representative

species of *Thyatira* in the east and another in the west, so Europe has one peculiar species, and, beyond the Ural Mountains, in Siberia, there is found a fourth. All these species differ in size and markings, so that they are readily to be distinguished; while the pattern of ornamentation, pale or pink blotches on the brown primaries, is preserved throughout, perhaps most strongly contrasting in the European *Thyatira batis*, which English collectors call by the pretty name of "Peach Blossom." Our eastern species of *Habrosyne*, *H. scripta*, surpasses, I think, the European *H. derasa* in beauty; it was first described from Canadian specimens by the eminent naturalist, the late Mr. Gosse, after whom I have given it the English name of "Gosse's Arches."

A LIST OF THE BUTTERFLIES OF PHILADELPHIA, PA.

BY HENRY SKINNER, M.D., AND E. M. AARON.

Appreciating the value to students in geographical distribution of faunal lists of a given region, with notes thereon, and the interest that such lists have for beginners in the same field in after years, we have concluded to publish here a list of the DIURNAL LEPIDOPTERA known to us to have been taken in the vicinity of Philadelphia. A circle drawn around the new City Hall, with a radius of ten miles, is the line of limit to the "vicinity" here treated of.

We wish to disclaim any intention to enter into the question of synonymy in this paper, and have, therefore, implicitly followed the catalogue of Mr. W. H. Edwards, edition of 1884, as being the most complete and at the same time the most accessible to students. The collections of the Academy of Natural Sciences of Philadelphia, of the American Entomological Society, and of Messrs. Peale*, Ridings*, Wilt*, Blake, Laurent, Johnson, Keen, Bartholomew, *et al*, have been looked through by one or both of us, or their owners have been consulted as to their captures in this locality. Very few of the species here enumerated are unknown to us personally as natives of this region.

To this we have added a brief list of species heretofore accredited to this region on what seem to us to be doubtful or insufficient grounds.

* Now in the possession of the American Entomol. Soc.

A few hitherto undescribed varieties have been given names, as we believe that any form sufficiently distinct to merit a characterization is worthy a distinguishing name. Such action, in our opinion, is in the interests of the science. A variety unnamed, or only indicated by a number or a letter of the alphabet, is much more likely to be ignored and subsequently redescribed than if it is at once elevated to the dignity of a recognizable name. *Papilio asterias*, var. *alunata*, is more likely to be respected than *P. asterias*, var. A.

Papilio ajax.—This species is said to have been found here in some numbers in past years. In a collecting experience of twelve years we have seen but three specimens. Pawpaw, its food plant, is scarce in this region. Nearly thirty years ago Mr. Newman reported rearing it in some numbers from the chrysalis.

Papilio philenor.—Occasionally common, but as a rule very few specimens are to be taken. During the season of 1888 a colony of larvæ was found here on the moon-vine (*Ipomœa bonei-nox*), a cultivated plant which is grown to a considerable extent in West Philadelphia. Most of these were infested by parasites, which, at this writing, have not emerged from their chrysalids. A feature of the unusually warm weather of the past winter was the finding of a perfect ♀ *Philenor* flying in Logan Square, opposite the Academy of Natural Sciences, on February 26th.

Papilio asterias.—Common and very variable. One very interesting variation we think worthy of description.

P. asterias, var. ♀, *alunata*, nov. var.—Type, American Entomological Society. Expands four inches; emarginations faint and nearly white; primaries apically produced, with but four sub-marginal spots, each one growing fainter as the last one in the lower disco-cellular nervule is reached; the spot between 1st and 2nd sub-costal nervures is faint; in the marginal row the spots are smaller and rounder. Secondaries: marginal lunules indicated very faintly, the blue between the nervures bright and well marked; no yellow spots internal to the blue, except the one at the apex, which is much smaller than the normal. Beneath: primaries as above, the orange spots usual in lower half of the sub-marginal row wanting. Secondaries with the sub-marginal row of orange spots very much smaller than in the typical form. No spot in the cell. In the collection of Dr. Skinner there is a striking specimen which differs from

the type of *alunata* in that the lunate spots on the secondaries are normal except in colour, which is the same as those in *P. troilus*. The submarginal row of spots on the primaries is wanting, the first one very faintly indicated. In other respects it does not differ from *alunata*. Although the type specimen of *alunata* has no locality label on it, we have good reason to believe it to be from this region. The specimen in Dr. Skinner's collection was taken in Fairmount Park.

Papilio troilus.—Common.

Papilio turnus.—Common. Philadelphia seems to be about the latitude where the yellow and black *(glaucus)* females are found in equal numbers, and consequently, as is to be expected, interesting gradational forms have been taken here. A number of specimens of ochraceous females have been taken. One remarkable specimen was captured by Dr. W. L. Abbott at Chestnut Hill, and is now in the collection of Dr. Herman Strecker, of Reading. Perhaps the best way to convey a correct impression of its appearance is to say that were a black ♀ to be pasted over a yellow ♀ and the black then torn off in irregular shreds leaving the yellow to show from below, the specimen so treated would closely resemble this very striking form. The lines where the black and yellow join, while irregular, are abrupt. There is no flaking or commingling of the two colours. Another specimen, which, like the above, is believed to be unique, instead of being bi-laterally divided like those figured on plate 5, of Vol. II., of "Butterflies of North America," by Mr. W. H. Edwards, is divided antero-posteriorly. The primaries were *glaucus*, and the secondaries normal *turnus*. This specimen is also in the collection of Dr. Strecker.

Papilio cresphontes.—Occasionally taken. A fine pair have been seen in Fairmount Park, and several have been taken near Angora.

Pieris protodice.—*Pieris rapæ* seems to have pretty well supplanted the indigenous species *protodice*, the latter having been much more common some years ago. At the present time it may be said to be one of the rarer species. At Gloucester its food plant has been observed to be the common pepper-grass *(Lepidium Virginicum)*.

Pieris rapæ.—Painfully common. A number of specimens of a marked varietal form have been taken. They may be known as follows:—

Pieris rapæ, var. *immaculata*, nov. var.—Same size and form as the

parent form, from which it differs in that it has no spots on the upper or under side of the primaries. Described from five specimens in the collections of Am. Ent. Soc., Dr. Skinner and E. M. Aaron.

Anthocharis genutia.—Rare. While this species has been taken at Westville, N. J., five miles below Camden, by Messrs. Newman, Wilt and Johnson at three or four different times in the past twenty years, we have searched for it unsuccessfully for a number of seasons past, in April and May, and have not succeeded until this season (May 6th) in capturing it—two female specimens. These we found flying over banks on which the white-flowered *Cerastium arvense* grew thickly. The food plant, *Sisymbrium thalianum*, though usually not common, is found there in considerable quantities. The locality is directly on the red clay banks of the Delaware, just west of Westville, at the point where the large shad nets are hauled in.

Callidryas eubule.—Exceedingly rare. Two or three specimens only are known to have been taken. It is, however, common in the pine barrens of South Jersey.

Colias eurytheme.—Very rare. The form *Keewaydin* has been taken in a few instances.

Colias philodice.—Common.

Terias nicippe.—Rare at Philadelphia, more plentiful below Camden, N. J. The food plants, species of *Cassia*, are not common in this locality.

Terias lisa.—Moderately common, but very local. Feeds on false sensitive plant *(Cassia nictitans).*

Danias archippus.—Common. The caterpillar is usually infested with a dipterous larva, perhaps *Mascicera archippivora.* In some cases not one of a large number of caterpillars reaches the imago state.

Agraulis vanillæ.—Exceedingly rare. Probably only an occasional visitant. It is possible that it has been brought here in one of its early stages on its commonest southern food plant, *Passiflora incarnata.*

Argynnis idalia.—Plentiful some years; usually rare. On page 543 of his "Butterflies of the Eastern United States," Mr. Scudder states that "the female generally flies a little faster than one can walk hurriedly. The ample wings are flapped with great vigor, but do not seem adapted

to swift flight." Dr. Skinner, in CANADIAN ENTOMOLOGIST, Vol. XIV., page 20, has already pointed out, that in this region the flight of the female "is exceedingly rapid, and generally in a straight line for about one hundred feet; then they do not alight on a flower or a bush, or flutter about like the male, but suddenly drop like lead in the long grass. It would be almost impossible to tell the exact spot where they alight, as they drop so suddenly, but on approach near it they are off like a shot again." Our observation, and that of a number of competent observers, consulted by us, substantiate the accuracy of the latter description of the habits of the female. It is more especially true of fresh females, which are being sought by the males.

Argynius cybele.—Common. Mr. Scudder, on page 560, says:—"The eggs are laid upon the leaves and stalks of the food plant, and not, as stated by H. Skinner, dropped from a distance upon the herbage." Dr. Skinner did not say or infer that this is the invariable habit of the insect, but simply recorded a single observation with the following comment:—"It remains to be seen whether this species always drops its eggs from a height, or only behaves in the peculiar manner occasionally while ovipositing." On page 562, Mr. Scudder asks:—"Is it possible that the female ever deposits by hovering in the air as Mr. Skinner reports?" Affirmative testimony, such as Dr. Skinner has given, is certainly, in a case of this kind, of greater value than any amount of negative testimony, and it should be added that Mr. G. H. Parker, now Instructor in Zoology in Harvard College, was present and also observed the actions of the female *cybele*, described by Dr. Skinner. Messrs. E. M. and S. F. Aaron have both also observed the same thing.*

Argynnis aphrodite.—Very rare.

Argynnis myrina.—Common in restricted localities. In the Proceedings of the Entomological Section of the Academy of Natural Sciences of Philadelphia, 1887, page 5, Dr. Skinner has described an interesting variation of both sexes of this species, found in Fairmount Park. These specimens are in the collection of Dr. Strecker.

* Since the above was written the authors have been favored with an opportunity at Westville, N. J., of observing *Argynnis myrina* following this same strange course in ovipositing. During this season also Mr. Aaron has detected *A. bellona* in the same habit, and he is strongly of the opinion that strange motions frequently observed in *A. diana* in Tennesse are to be accounted for in the same way, though at the times of observation they seemed quite unaccountable.

Argynnis bellona.—Never very common.

Euptoieta claudia.—Rare.

Melitæa phæton.—Rare; very local.

Phyciodes nycteis.—Very rare.

Phyciodes tharos.—Common in its various forms.

Phyciodes Batesii.—Reported to have been not rare in this locality twenty years ago. Tryon Reakirt described it from types found at Gloucester, N. J. We are not aware of its capture of late years, except in two examples.

Grapta interrogationis.—Moderately common.

Grapta comma.—Not common.

Vanessa Antiopa.—Common.

Vanessa Milberti.—Exceedingly rare. Only two or three specimens known to have been taken here.

Pyrameis atalanta.—Very common. In this locality *Atalanta* generally feeds on false nettle, *Boehmeria cylindrica.*

Pyrameis Huntera.—Very common. Mr. E. M. Aaron has observed a female laying her eggs on the Canada Thistle *(Cirsium Arvense)*, in Fairmount Park.

(To be continued.)

THE ENTOMOLOGICAL CLUB OF THE A. A. A. S.

The annual meeting of the Club will be held at Toronto in the room of Section F., University of Toronto Building, beginning at 9 a. m. on Wednesday, August 28th. Members of the Club are requested to register at once upon arrival and obtain the Club badge. Those who intend to contribute papers are requested to send the titles to the President, Mr. James Fletcher, Government Experimental Farm, Ottawa, Ontario, or to the Secretary, Dr. D. S. Kellicott, Buffalo, N. Y. It is expected that there will be a large attendance and an especially interesting series of meetings.

The annual meeting of the Entomological Society of Ontario will be held at London during the following week. It is to be hoped that many of our visiting entomologists and associates will be present.

DROVES OF LYCÆNID CATERPILLARS HERDED BY ANTS.

BY MRS. WYLLY, OF INDIA.*

The larvæ of *Tarucus theophrastus* Fabricus are cultivated and protected by the large, common black ants of Indian gardens and houses. The caterpillar, which varies in colour from light pure green to a dark reddish tint [this is a common variation in Lycænid larvæ], is about three-quarters of an inch long, louse-like in shape, and slow in movement, and it feeds on the *Zizyphus jujuba*, a small, thorny bush of the jungles with an edible, astringent, yellowish fruit, the "Byr-coolie" of the natives. Some Lycænidæ larvæ have the power of protruding and retracting at will two small, fleshy tentacles or horns, each tufted with a brush of fine hairs, from the upper surface of the tail segments. Between [on the next segment anteriorly] these tentacles is a small slit, from which they exude a small drop of a juice of some sort eagerly sought by the ants, and which they can generally procure by stroking the larvæ gently with their antennæ. The ants set up what appears to be merely a temporary nest at the foot of the tree, the better to carry on their operations. Just before the rains set in, about the middle of June, great activity among the inhabitants of a Zizyphus tree may be observed. The ants are busy all day long running along the branches and leaves in search of the larvæ, and without fail an ant will come to one full-grown, and meditating on the choice of a snug retreat [in which to turn to a pupa]. A friend or two turning up, the ants set to work to guide and drive their caterpillar in the direction they wish him to go, *i. e.*, down the stem of the tree towards their nest. This is not always an easy business if the prisoner is refractory and would prefer going somewhere else; but as a rule they are docile and easily led. Having kept guard over him until they get him safely into his proper berth in the row, and he has accepted their ultimatum as final, he drops off into a preliminary doze and undergoes his transformation into a pupa. If you gently scrape away the loose earth piled up at the base of the tree you will see some hundreds of larvæ and pupæ in all stages of development arranged in a broad even band all round the trunk and lightly covered with earth. The ants object to their being uncovered, and will immediately set to work to re-cover them, and if you persist,

* Reprinted from an article entitled Butterflies and Ants, by Lionel de Niceville, F.E.S., in the Journal of the Bombay Natural History Society, Vol. III., p. 164 (1888).

they will remove all the chrysalids and bury them lower down. When the butterfly is ready to emerge, which is in about six or seven days, it is tenderly assisted to disengage itself from its shell, and should it be strong and healthy, it is left undisturbed to spread and strengthen its wings and fly away. But if, by any mischance, it emerges deformed and too crippled to use its wings, a catastrophe occurs. In one case, a butterfly had fallen to the ground before its opening wings had dried, and one of the soldier-ants tried to rescue it. He carried it back to the tree with the utmost care, and made several attempts to assist the butterfly to hold on again. Finding his efforts unavailing, he left the cripple for a short time to recover itself. On his return, seeing no improvement, he appeared to lose patience, and, rushing in, bit off both the deformed wings at the base, and carried off the wingless body into the nest below, whether as food for the community or for what other purpose I was unable to ascertain. That was the only occasion on which I ever saw any high-handedness on the part of the ants, though their usual ill-temper requires no very close observation to detect.

It is a curious sight to watch the fragile and delicate newborn butterflies wandering about, all feeble and helpless, amongst the busy crowd of coarse, black ants, and rubbing shoulders in perfect safety with the ordinary fierce big-headed soldiers; as odd a contrast as the fresh creamy whiteness of the opening wing, the flash of purple and blue, and the sparkle of green and silver eyes is to the darkness and dinginess of their queer home. For some time after the butterflies have gained strength to fly away, they remain hovering over the nest. A larva of a species of Catopsilia [one of the Pierinæ, or "Whites,"] I threw down as an experment, was immediately set upon and torn to pieces in a second by the ants.

I took a *T. theophrastus* larva from a tree, and introduced it on the pathway of another company of the same species of ants who lived in our verandah, but kept no "farm," and it was odd to see the ants come tumbling out headlong to fight the intruder, and the sudden way they cooled down on investigation of the foe; none attempted to harm him, and he was politely escorted across their boundary, the ants running alongside, and feeling him all over with their antennæ. This must have been instinct, as they could have no former knowledge of him as a "milk-giver." The dead chrysalids in an ants' nest are carefully removed and thrown away outside; the ants also distinguish between the dead and living.

ADDITIONS TO THE LIST OF CANADIAN COLEOPTERA.

BY ALVA H. KILMAN, RIDGEWAY, ONT.

(Continued from page 110.)

3443—*Trogoderma tarsale* Melsh. Not rare.

3683—*Carpophilus antiquus* Melsh. Rare; under bark of dead maple and beech.

3686—*Colastus maculatus* Er. Rare; took three or four from the stump of a maple tree, cut while the sap was running.

3712—*Eupuræa peltoides* Horn.

3753—*Cryptarcha strigata* Fab.

3823—*Corticaria pumila* Lec.

3871—*Bactridium striolatum* Reit.

By placing chips on the top of fresh-cut stumps of maple, oak and other trees, and turning them from time to time, these last-named species are found. Attracted by the flowing sap, they hide under the chips and may be taken along with the more common species of *Nitidulidæ*, *Trogositidæ*, etc., in considerable numbers.

3987—*Ptilodactyla angustata* Horn. Swept from weeds. June. Not common.

3992—*Eucinetus morio* Lec. Swept from bushes. Muskoka. August.

4015—**Cyphon collaris* Guér. Rare; beaten from wild gooseberry.

4031—*Dromæolus basalis* Lec.

4038—*Dromæolus striatus* Lec.

These species, a few specimens of each, were got by beating. I have no record of the plant.

4097—*Cardiophorus convexus* Say. Not common on conifers.

4217—*Elater pedalis* Germ. Several taken in sweeping net.

4228—*Elater socer* Lec. Rare; found two under bark.

4229—*Elater rubricollis* Hbst. One by beating in July.

———*Elater ? macilentus* Rand. One taken on beech. June.

4290—**Agriotes oblongicollis* Melsh.

4305—*Melanotus longulus* Lec.

4335—*Melanotus tenax* Say. Taken occasionally by beating shrubbery. June and July.

4439—*Corymbites fulvipes* Bland. Rare on beech and maple. June.

4475—**Corymbites fallax* Say. Occasionally on thorn.

4494—*Corymbites aratus* Lec. Two specimens on lake shore.

4542—*Drapetes geminatus* Say. I find these pretty little beetles in a certain locality each year on elder blossoms.

4666—*Actenodes acornis* Say. Rare; one specimen on oak.

4767—*Rhyncheros sanguinipennis* Say. Found one flying in a pine grove. Mr. Jas. White also got one on pine.

4820—*Pyropyga decipiens* Harr. Not rare; on beech and other foliage. June.

4911—*Podabrus corneus* Lec. One specimen; no record.

5177—*Clerus nigriventris* Lec. Quite abundant on pine brush. July and August.

5229—*Laricobius Erichsoni* Rosen. Taken on pine in May; quite common. This is the *L. rubidus* of the Toronto list and of Canadian collections.

5243—*Ptinus bimaculatus* Melsh. Three years ago I found one specimen crawling around in a cork-lined box used for duplicates. As I could not discover that my duplicates were infested, I did not overhaul the box. The following summer, June, 1887, I found two or three specimens of this interesting beetle in the same box. Since then I have kept it as a breeding place for this species, and in May, 1888, found several more specimens therein. I have no recollection of having ever placed in the box anything but Canadian beetles, and thus introduced it from abroad. The beetles submitted as food for the larvæ bear evidences of having been used as designed. Packard says that the commoner species, *Ptinus fur* Linn., is known to attack collections of insects.

5251—*Ernobius granulatus* Lec.

5254—*Ernobius luteipennis* Lec. Both rare on pine. June.

5289—*Vrilletta convexa* Lec. One specimen taken while beating. Mr. Ulke says:—"This is a California species; never before saw it east."

5339—*Sinoxylon basilare* Say. Rare.

5404—*Ennearthron thoracicorne* Zeigl.

5408—*Odontosphindus denticollis* Lec. Rare; swept from shrubbery.

5459*a*—*Onthophagus Orpheus* Panz. One specimen flying. August.

6011—**Callidium æreum* Newm. Two taken at Ridgeway on pine, one at Edmonton by Mr. White, and one at Hamilton by Mr. Johnston.

6090—*Phyton pallidum* Say. I took a pair of these handsome little Longicorns on wilted leaves of red oak *(Quercus rubra)* July 12, 1887. It is rare indeed.

6183*a*—*Xylotrechus lunulatus* Kirby. Not common on hickory.

6209—**Microclytus gazellula* Hald. Several taken by Mr. Moffat at Hamilton. Three were taken here on hickory.

6609—*Bassareus detritus* Oliv. Several swept from foliage.

6671—*Pachybrachys trinotatus* Melsh. Not common ; taken by sweeping with net, but I cannot say upon what plant.

6945*b*—*Oedionychis limbalis* Melsh. Beaten from leaves of ash and linden.

7003—*Systena blanda* Melsh. Rarely found in moss. March.

7534—*Hypophlœus tenuis* Lec. Not rare under bark of stumps.

7693—*Canifa pusilla* Hald. Quite common in fungi.

7698—*Nothus varians* Lec. Not common in crevices of bark on dead trees.

7840—*Mordellistena convicta* Lec. Found occasionally on thorn blossoms.

7900—*Xylophilus nebulosus* Lec. Taken while sweeping ; rare.

7967—*Anthicus spretus* Lec. Not rare ; by sweeping in wet places.

8364—*Apion erythrocerum* Smith.

8371—*Apion impunctistriatum* Smith.
These were found in moss in spring.

8427—*Phytonomus punctatus* Fab. Common on lake shore and in meadows. June to September.

8429—*Phytonomus setigerus* Lec. A pair taken by Mr. Jas. White, of Edmonton, Ont., on the sand near some stream or pond.

8440—*Listronotus sordidus* Gyll. Rare ; on lake shore.

8567—*Onychylis nigrirostris* Boh. Occasionally found on the shore.

8575—*Endalus ovalis* Lec. Swept in numbers from the grass growing on the margin of a pond in the woods. August.

8582—*Lissorhoptrus simplex* Say. Common on the petals of the yellow pond-lily.

8607—**Otidocephalus Chevrolatii* Horn. Not rare on leaves of elm, etc.

8611—*Magdalis perforata* Horn.

8690—*Thysanocnemis helvolus* Lec. One specimen from foliage of hickory, July 26 ; this is a rare species.

8753—*Acamptus rigidus* Lec. Not common on lake shore.

8786—*Cryptorhynchus parochus* Hbst.

8788—*Cryptorhynchus pumilus* Boh.

8795—*Cryptorhynchus fallax* Lec.

These kinds I find occasionally on the bark of dead linden, etc.

8820—**Acoptus suturalis* Lec. Quite common on hickory. June and July.

8834—*Cœliodes flavicaudis* Boh. Rare; swept from smart weed (*P. persicaria*).

8893—*Pseudobaris t-signum* Boh.

9071—*Pityophthorus cariniceps* Lec.

9223—*Brachytarsus alternatus* Say.

These three species I have taken rarely while sweeping.

PREPARATORY STAGES OF EUPLEXIA LUCIPARA, LINN.

BY HARRISON G. DYAR, RHINEBECK, N. Y.

EGG.—Nearly spherical, flattened at the base, marked with about twenty-five longitudinal ribs and numerous transverse ridges, the former somewhat irregular and running to a depression on the summit; color whitish, with a circle around the middle and a spot on top of purplish-brown; these marks more or less confluent. Length about .5 m.m.

NEWLY-HATCHED LARVA.—Walks in the manner of a geometer, not using the central abdominal legs. It is of a whitish colour, with many black dots, from each of which arises a hair. Head, thoracic legs, and cervical spot, black. Duration of this stage about four days. When not feeding, the insect remains stretched out at full length on the back of a leaf.

AFTER FIRST MOULT.—Semi-transparent, whitish, with fine black dots as in the previous stage, a transverse row to each segment. Head whitish, mouth-parts black. Duration of this stage four days.

AFTER SECOND MOULT.—Differs from the preceding only in size. Duration, five days.

AFTER THIRD MOULT.—Whitish, a blackish lateral band with traces of dorsal and sub dorsal lines on first three segments. Black piliferous dots. Duration, six days.

AFTER FOURTH MOULT.—Much the same. The twelfth segment is somewhat thicker than the rest of the body. Semi-transparent, with the markings indistinct. Lateral line white, shaded with blackish above, the

black dots encircled with white. Duration of this stage about seven days. At this period, the larva was observed to use all its legs in walking ; but the exact period when this power was acquired was not noted.

After Fifth Moult.—The body now appears green. A row of white spots, one on each segment, above the interrupted sub-dorsal line. Duration about seven days.

After Sixth Moult.—Head rounded and smooth, slightly depressed at the vertex, partly withdrawn beneath the skin of joint 2. Pale-whitish, mouth-parts darker. Body semi-transparent whitish-green ; a lateral white line edged with blackish above. On each segment to the twelfth, an oblique blackish shade, running back from the base upward, and terminating in a white point on the next segment, these points forming a sub-dorsal row. The two points on joint 12 are nearer together and larger than the others. Joint 12 is thickened and larger than the other segments. There is an interrupted dorsal blackish shade with white points. Body furnished with thin, fine, short, whitish hairs. Duration of this stage seven days.

After Seventh Moult.—Mature larva. Similar to the preceding. Head slightly shaded with blackish above. The dorsal line appears as traces of a white dorsal stripe, edged with blackish on both sides, occuring in the fold between the segments. The color of the body is a darker, more velvety green, less transparent, but whitish beneath. There is a row of small whitish dots, one on each joint, above the spiracles, and another similar row between the dorsal and sub-dorsal lines. Each dot of both rows furnishes a short whitish hair. The two spots on joint 12 are quite conspicuous. Spiracles black. The larva rests with its body bent near the middle, forming a loop, the head touching the last segment. It feeds mostly at night. Length about 23 m.m. Duration of this stage about eleven days.

Pupation occurs in a very slight cocoon beneath the surface of the ground. There appear to be two broods annually, the winter being passed in the pupa state. This insect is common to America and Europe, according to Dr. Speyer.* Humphreys and Westwood give a figure of the mature larva,† and the same stage has been described by Edwards and Elliot.‡

* Entomologische Zeitung, Stettin, Vol. XXXVI., page 153.
† British Moths, Vol. I., plate 35, figure 5.
‡ Papilio, Vol. III., page 133.

NOTE ON THE GENERA GORTYNA AND OCHRIA.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

I have lately had an opportunity of examining bred specimens of the European *Ochria ochracea (flavago)*. The clypeal tubercle may be felt with a fine pin or seen under the glass when the frontal scales are partly removed. We have two North American species agreeing with *Ochria*, viz., *Sanzalitae*, from California, and *Buffaloensis*, from the east. With the former, the European species has a nearer resemblance externally; our eastern species differing much in colour. The type of *Gortyna* Hüb., is *Micacea*, and the type of *Hydræcia* Guen., as indicated by an asterisk in the Species Genèral, is this same species. Consequently *Hydræcia* falls. The genus *Ochria* is used by Hübner for the sole species *flavago*, consequently this must obtain for the genus, which differs from *Hydræcia* of European authors mainly in the presence of the clypeal tubercle. While *flavago* resembles in colour several North American species of *Gortyna*, I may have overestimated its resemblance to our eastern *cataphracta*, although a resemblance certainly exists. The type of *Apamea* is now difficult to ascertain, but if, as I assume, it is really *nictitans*, it may give way to the earlier *Gortyna*, as the species do not seem to be generically separable. In CAN. ENT., XIV., 17, I gave a list of the North American species, which may be amended as follows:—

Gen. GORTYNA Hübn.

(= *Hydræcia* Guen.)

purpuripennis Gr.
juvenilis Gr.
erepta Gr.
immanis Guen.
obliqua Harv.
stramentosa Guen.
nictitans Esp.
var. *erythrostigma* Haw.
var. *lucens* Tr.
inquæsita G. & R.
cerina Gr.
rigida Gr.
impecuniosa Gr.
cataphracta Gr.
purpurifascia G. & R.
rutila Guen.
Harrisii Gr.
speciosissima G. & R.
cerrussata Gr.
marginidens Guen.
limpida Guen.
appassionata Harvey.
necopina Gr.
nitela Guen.
var. *nebris* Guen.
serrata Gr.

Gen. OCHRIA Hübn.
(= *Gortyna* Led.)

sanzalitæ Gr. *Buffaloensis* Gr.

The genus *Gortyna*, as above defined, contains species of Noctuidæ, having the ♂ antennæ of various structure, fringed with hair, brush-like, in *serrata* pectinated. The front is smooth, thickly, somewhat woolly haired. Labial palpi short, with small terminal article. The thorax has an elevated scale ridge behind the collar, and a tuft behind, while the abdomen is stout and usually untufted. The eyes are naked, the tibiæ unarmed. The larvæ, so far as known, are internal feeders in roots and bulbs. They are livid or yellowish, with dark warts, and prothoracic shield; pupating in the ground.

CORRESPONDENCE.

PHALANGODES ROBUSTA (Pack.)

Dear Sir: Packard, in 1877, described this species from specimens taken in Colorado by Mr. E. Ingersoll in 1874, but the precise locality and habitat were entirely forgotten. In his recently published memoir on the Cave Fauna of North America (Proc. Nat. Ac. Sci., Vol. IV.), he redescribes the species, which is of extreme interest as being an out-of-door species of a usually cave-inhabiting genus, and suggests that it will probably be found under stones, though its precise manner of life, etc., remain as little known as in 1877. I am therefore pleased to be able to record that I have found a *Phalangodes*, agreeing quite well with *P. robusta*, in very considerable abundance by Swift Creek, Custer Co., Colorado, in damp places in a grove of *Populus tremuloïdes, always under logs*, and never, to my knowledge, under stones. This is about 8,200 feet altitude. I met with the same species under logs near Clearwater Creek, on the Grand Mesa, Mesa Co., at about 9,800 feet altitude.

May 31, 1889. T. D. A. COCKERELL, West Cliff, Colorado.

A NEW MYRMOPHILE.

Dear Sir: On pp. 165–166, Vol. xx., Dr. Hamilton gives a list of eight species of *Cremastochilus* known to be Myrmophilous. I can add one other, namely, *C. Knochii* Lec., which I found in an ants' nest on March 30th, last year, near Swift Creek, Custer Co., Colorado, at about 8,100 feet alt. This was under a stone on the open prairie.

T. D. A. COCKERELL, West Cliff, Colorado.

Mailed July 2nd.

The Canadian Entomologist.

VOL XXI. LONDON, AUGUST, 1889. No. 8.

IBALIA MACULIPENNIS, HALDEMAN.

BY W. HAGUE HARRINGTON, OTTAWA.

The genus to which this very interesting species belongs differs so widely from the rest of the Cynipidæ that it has been separated from them as a sub-family, under the title *Ibaliinæ*. Its members can be readily recognized by the cultriform abdomen and more strongly veined wings, as well as by their greater size. The cultriform—*i. e.*, knife-shaped—abdomen is in itself remarkable enough to attract the attention of all who may chance to see the insects.

From Canada two species are recorded: *ensiger* Nort., ♀, and *maculipennis* Hald., ♀. The former I have not yet been able to find here, but Provancher (Faune Ent. Can., II., 554) records it as frequently seen. Both species were described from the United States (Pa.), with four others: *anceps* Say. (Ark.), *Montana* Cress. (Col., ♀), *rufipes* Cress. (Nev., ♀), and *scapellator* Westw. (Ga., ♂). The last is the only species of which the ♂ appears to be known. The present species was described by Haldeman (Proc. Acad. Nat. Sci., Phil, III., 127) as follows:—"*Ibalia maculipennis* ♀.—Yellow; meso and meta-thorax black, except the scutel and two longitudinal bands above, and a spot beneath the wings; eyes, apex of antennæ, base of coxæ and middle of femora (the greater part of the posterior ones) black; posterior tibiæ blackish toward the apex; wings yellow, apex and a central spot fuliginous. Seven lines long, eleven expanse. South-eastern Pennsylvania, in May and June."

A more detailed description of the ♀ is given by Provancher (Faune Ent. Can. Add., 165), and it is figured in the report of the U. S. Entomologist for 1877, but so far as I know there has been published no description of the ♂. It differs from the ♀, however, but slightly in general appearance, except in being darker in colour, especially the thorax. The abdomen is nearly straight above, instead of being curved as in the ♀, and the terminal segments are slightly swollen, so that,

viewed from above, the apical third of the abdomen appears thicker than the middle segments.

The antennæ have 14 joints, those of the ♀ having only 13. The third joint is longer and considerable stouter than the succeeding ones, and is deeply and obliquely excavated on the outer side, a little beyond the middle. Can this groove be of any use for holding the antennæ of the ♀? The object of the present note is to call attention to the habits of the species, and to indicate where it may be looked for; points upon which little, if anything, is known, I believe. Mr. Ashmead, to whom I sent a pair of these insects, wrote to me in regard to them:—"I know nothing of the habits of the *Ibaliinæ*, excepting what Giraud wrote, "Il est tres vraisemblable que sa larve vit parasite de quelque grande Coléoptère lignivore.'"

The fact that an entomologist so well acquainted with the Cynipidæ, and the literature treating of them, had to make this admission, induces me to think that the few observations I have been fortunate enough to make (incomplete as they are) will be welcome to students of these insects, and may, perhaps, furnish a clue to enable other entomologists to work out the full life histories of the members of this anomalous and interesting sub-family.

My first acquaintance with *Ibalia maculipennis* was made in 1883, as I find by the following memo. in a note-book:—"June 28th. Two Hymenoptera, apparently ovipositing in maple." The note is illustrated by a rough sketch of the insect, sufficient to identify it. At this time my attention was given chiefly to Coleoptera, and other orders were only incidentally collected, so that no special value was attached to the observation. The following summer a specimen was taken on 26th June, but its label does not give any particulars, and no record of its capture is found in my note-book.

In 1886 I was fortunate enough to capture six specimens, of which three were ♂ and three ♀. My friend, Mr. Guignard, had taken a ♀ upon an old maple on 16th June, but it was five days later that I found my first two ♀ ♀. They were ovipositing upon an old, badly decayed maple; and in one instance the ovipositor was deeply inserted. Upon the same tree I captured another female, also ovipositing, on the 23rd June; and upon the same day secured my first male upon another old

maple about 100 yards away. The other two males were taken on 25th June.

None of the insects were seen in 1887, although carefully looked for in that locality, but during the past season they were again observed upon a different kind of tree and in a different locality. On 10th June, Mr. Fletcher captured two females ovipositing in a beech, and on the 24th June, while with him we each took a female upon beech trees in the same grove. That taken by myself was dead, having met with an accident while ovipositing.

Having thus recorded the dates of capture of the specimens coming under my observation, a few remarks may be made upon the manner of oviposition. When the ovipositor is not in use it forms a complete coil within the abdomen, which is really but a flat sheath to contain it, and so transparent that it is perfectly visible. The triangular ventral scale, which is the full length of the abdomen, closes into it like a knife-blade into its handle, and the ovipositor is completely protected. When the ventral scale is deflexed the abdomen has much the outline of a lobster's claw, and the ovipositor when protruded is seen to be fully an inch in length, or longer than the insect itself.

During the act of oviposition, the insect, by means of its long legs, keeps its body far enough from the surface of the tree to enable it to deflex the ventral scale at a right angle to the body, with the tip touching the bark. A perfect support is thus formed for the ovipositor, which is gradually worked into the tree in much the same manner as that of *Thalessa.*

All the insects observed ovipositing have been on the trunks of large trees, at an average distance of about two feet from the ground. The six individuals seen in 1883 and 1886 were all upon old maples, near Hull, on the Quebec side of the Ottawa river. The trees were old and rapidly decaying (in two instances already dead), having a diameter of nearly two feet, and with the bark proportionately thick, so that the ovipositor was none too long to reach the wood, unless the insect availed itself of crevices in the bark. The insects taken last June were all ovipositing upon large beeches in a grove within the city limits, and within a few minutes' walk of my own house. Mr. Fletcher informs me that each of those captured by him had the ovipositor deeply inserted, and that he had much difficulty in pulling it out—breaking it, indeed, in one instance. My own specimen,

as before stated, had died at its post, where it was held by the inserted ovipositor.

Here, unfortunately, our observations end, and we can only form conjectures as to the life of the larvæ. Provancher remarks of the genus that, "Their larvæ live as parasites in the body of other larvæ;" and with reference to *ensiger*, he says: "We have frequently met this insect in company of Braconids, upon trunks of dead fir-trees, searching without doubt to deposit its eggs in the body of lignivorous larvæ." His authority for the first statement is not given, but probably he has accepted the conjecture of some European Entomologist.

Prof. Riley has demonstrated, in the case of Thalessa, how unsafe it is to accept conjecture as fact, however probable it may seem. Still, in the absence of a complete knowledge of an insect's life, one must often fill in by conjecture the missing links, and wait for further investigations to prove their value. As regards *Ibalia maculipennis*, there are two ways in which the larvæ may live, viz., either directly upon the dead, or decaying woody tissues of the tree, or in or upon the bodies of larvæ which do so subsist.

The former course seems less probable, and I am inclined to think with those who believe that it is parasitic upon lignivorous larvæ. What species, then, is it likely to be parasitic upon? The maple trees upon which it occurs are badly infested by *Tremex columba*, *Xiphydria albicornis* and *Dicerca divaricata*, and in a less degree by other insects. The beech trees are also infested by the Tremex and Dicerca, and like the maples are much frequented by Thalessa. Is Ibalia parasitic upon its Hymenopterous (closely connected) relatives, or upon the Coleoptera?

Now that its time and place of occurrence are known, I hope that its history may soon be worked out in full. Its season of appearance is apparently brief, as all the specimens from this locality have been taken in June—the earliest upon the 10th, and the latest on the 28th. The insect might thus readily escape notice, even when not rare, as they are by no means conspicuous, either when ovipositing or crawling upon the rough trunks they frequent. But, if systematically searched for during the month of June upon old trees, they would probably be found by many of our entomologists.

While not abundant, these insects cannot be classed as especially rare, for besides the specimens mentioned in this note, I have seen several which

were in the collection left by the late Mr. Billings, of this city, and which were probably captured in this vicinity. I have also found a ♂ among some *Hymenoptera* sent to me for examination by Mr. Evans, of Trenton, Ont., and have been informed by Provancher that a specimen (without abdomen) was shown to him some years ago at St. Hyacinthe, Que.

One female taken in 1883 had the cavity of the abdomen swarming with small mites, which also covered the ventral scale, and were thickly scattered along the protruded ovipositor. They appear to belong to species distinct from any yet noticed, although I have found many insects which infest decaying wood to be subject to the attacks of such parasites.

A LIST OF THE BUTTERFLIES OF PHILADELPHIA, PA.*

BY HENRY SKINNER, M.D., AND E. M. AARON.

(Continued from page 131.)

Pyrameis Cardui.—Usually common; some years quite rare.

Junonia cœnia.—Quite local; never very common. Mr. Scudder, on page 501, speaks of its "rapid, strong and enduring flight." This would seem to indicate that the habits of this insect in the New England States differ materially from those in this locality or further south. It is rare that this butterfly is here observed over a foot from the ground, and then its flight is most erratic, and usually consists of a few fluttering strokes of the wing followed by an idle sail. This is also the manner of flight from Virginia to Florida, according to the observations of E. M. Aaron.

Limenitis ursula.—Rare.

Limenitis disippus.—Common.

Neonympha canthus.—Rare. A few specimens have been taken near Gloucester, N. J.

Neonympha eurytris.—Common in restricted localities.

Satyrus pegala.—Exceedingly rare; taken at Mount Holly, N. J., by E. M. Aaron in 1884. It is recorded as from Gloucester, N. J., by the collectors of twenty years ago.

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* The Authors wish to state here that as they belong to the two opposing schools in the matter of the capitalizing of specific names, they have left that matter to the judgment of the Editor. [The Editor sent the MS. unchanged to the printer.]

Satyrus alope.—Rare ; but few specimens known to have been taken nearer than Westville ; also at Mt. Holly, N. J., where it is quite common at times.

Libythea Bachmanni.—Exceedingly rare. Two specimens taken in West Fairmount Park.

Thecla halesus.—Very rare. Two or three were taken some years ago near Westville, N. J.

Thecla M-album.—Mr. Edwards, in his catalogue of 1884, records this species from Pennsylvania ; but, though taken on the New Jersey coast, we are not aware of its having been taken in this portion of our State.

Thecla humuli.—Not common.

Thecla calanus.—Not common.

Thecla smilacis —Exceedingly rare.

Thecla Augustus.—Rare. Westville, N. J.

Thecla irus.—Rare. Only reported from Westville, N. J.

Thecla Henrici.—Rare. Westville, N. J.

Thecla niphon.—Rare. Fairmount Park and Westville, N. J.

Thecla Titus.—Exceedingly rare. Cobb's Creek.

Feniseca Tarquinius.—Very local ; never common. As a sample of its extremely local distribution, it may be stated that at Chamounix, in West Fairmount Park, this species is found flying around one tree, where, perhaps, 90 per cent. of all known to us to have been taken in this vicinity have been captured. There are several large beech trees there on which considerable numbers of *aphidæ* are nearly always to be seen.

Chrysophanus hypophleas.—Common. An albino form of this species was taken in Fairmount Park several years ago.

Lycæna pseudargiolus.—This species and its varieties are moderately common.

Lycæna comyntas.—Very common. Mr. Scudder quotes rather doubtfully the statement made by E. M. Aaron, in Vol. IX. of this journal, that this species was observed depositing its eggs on ragweed (*Ambrosia* sp.). Such, however, was the case.

Ancyloxypha numitor.—Common.

Pamphila massasoit.—Local ; never very common. Swamps west of George's Hill and Westville, N. J.

Pamphila zabulon.—Very local ; not common. The form *hobomok* is not so rare ; occasionally it is found in considerable numbers along Cobb's Creek. *Pochahontas* is a much rarer form.

Pamphila sassacus.—Very rare. West Park.

Pamphila Huron.—Exceedingly rare. Cobb's Creek.

Pamphila phylæus.—Rare. West Park and Cobb's Creek.

Pamphila otho.—The typical form is only known to have been taken in one example near the Bartram Garden. The form *egeremet* is not common, though occasionally taken in some numbers near George's Hill reservoir.

Pamphila Peckius.—Exceedingly common. An odd form of this usually very constant species was taken near Benedict Arnold's house, in East Park. It is characterized by a marked suffusion of the black ground colour above, leading to a nearly complete obliteration of the markings on the secondaries, and the greatly restricted area of the light coloured markings, beneath which stand out separate spots rather than suffused areas, as is usual.

Pamphila mystic.—Though this species is not known to have been taken in the immediate vicinity of Philadelphia, we have thought it well to record it as having been captured in several examples at Penn's Manor, above Bristol, Penn.

Pamphila cernes.—Very common.

Pamphila manataaqua.—Not common.

Pamphila verna.—Moderately common. The form *pottawattomie* has occasionally been taken here.

Pamphila metacomet.—Not common.

Pamphila accius.—Very rare. Cobb's Creek.

Pamphila panoquin.—Very rare. Cobb's Creek and George's Hill.

Pamphila ocola.—Very rare. Cobb's Creek and Eastwick's.

Pamphila Pontiac.—Very rare. West of George's Hill.

Pamphila Delaware.—In his orginal description, Mr. W. H. Edwards states that his types were taken in Philadelphia by Mr. Newman. This is the only authority that we have for attributing this species to our fauna.*

* Since the above was written, a single faded female specimen was taken, June 21st, by Master Joseph M. Aaron, at George's Hill Reservoir.

Pamphila fusca.—Not common, but has been taken in limited numbers in West Park and at Cobb's Creek. Mr. Edwards gives only "Gulf States" as the locality.

Amblyscirtes vialis.—Rare. Very local.

Pyrgus tessellata.—Common. The form *communis* has been taken in some quantity at Cobb's Creek and Fairmount Park.

Nisoniades brizo.—Rare. Westville, N. J.

Nisoniades icelus.—Very rare. Three or four examples have been taken near West Laurel Hill.

Nisoniades ausonius.—Not common.

Nisoniades martialis.—Very rare. George's Hill reservoir.

Nisoniades juvenalis.—Common.

Pholisora catullus.—Common.

Eudamus pylades.—Not common.

Eudamus Nevada.—Rare. Several specimens of this species have been taken in Fairmount Park. One of these is in the collection of E. M. Aaron, and, besides agreeing entirely with Mr. Scudder's description, has been determined as *Nevada* by Mr. W. H. Edwards.

Eudamus bathyllus.—Common.

There seems to be good reason to doubt the specific worth of these last three forms. It is quite likely that careful rearing will prove them to be forms of one widely spread species.

Eudamus lycidas.—Rare. Very local. Cobb's Creek and west of George's Hill.

Eudamus tityrus.—Very common.

Eudamus proteus.—Extremely rare. One specimen from East Park and two at Cobb's Creek.

In addition to the above list of eighty-six species the following are added here as accredited to this region, but are rejected by us on account of insufficient testimony:

Vanessa J-album.—In his latest work Mr. Scudder credits this species to our fauna as "'rare,' (Blake)." Mr. Blake informs us that he has

only taken this species in one specimen in Venango County, this State, and is not aware whence Mr. Scudder derives his information.

Thecla acadica.—This species is also referred to this locality by Mr. Scudder, and Messrs. Blake and Edwards are quoted as authorities. We fail to find anyone who has taken it or knows of its capture in this vicinity.

Chrysophanus thoe.—This species is attributed to this region by Mr. Scudder as "'rare,' (Blake)." As in the case of *J-album*, Mr. Blake is sure that he has never seen the species in this locality.

Chrysophanus epixanthe.—In this case Mr. Blake is quoted by Mr. Scudder as stating that this species is "neither common or rare." Mr. Blake is not aware that it has ever been taken hereabouts, but he has taken it at DaCosta, N. J., thirty miles from Philadelphia, on the Camden & Atlantic R. R.

Hesperia unna.—This species, not yet incorporated in any of our catalogues, is described as a new species from "Philadelphia," by Carl Plötz, in his "Die Hesperiinen-Gattung Hesperia Aut. und ihre Arten." —Stettin Entomologische Zeitung, Vol. XLIV., p. 204, 1883. This species is not compared with any of its congeners, and the description is vague and meagre. It is placed between *brettus* and *phylæus* in Herr Plötz's arrangement of this genus. We are in doubt as to which of our known species it can be, but do not think it possible that it can be new.

While we feel, certainly with justice, that this list of eighty-seven species is a remarkable one for so restricted a locality, we do not suppose that it is entirely complete. If any of our entomologists can add to it or throw further light on the localities or numbers captured, we shall be glad to receive such information.

In closing, we desire to bear testimony to the great value of the work on our Eastern Butterflies, now being published by Mr. Scudder, a work that should be in the library of every student of the Lepidoptera. Our few critical allusions to this work above are made necessary, simply because the extreme care taken by Mr. Scudder to avoid error make those that have crept in the more observable, and, consequently, the more deserving of the pointing out.

Philadelphia, May 16, 1889.

POPULAR AND ECONOMIC ENTOMOLOGY—No. 4.

BY JAMES FLETCHER, OTTAWA.

THE IMPORTED CURRANT SAW-FLY—(NEMATUS RIBESII, SCOP).

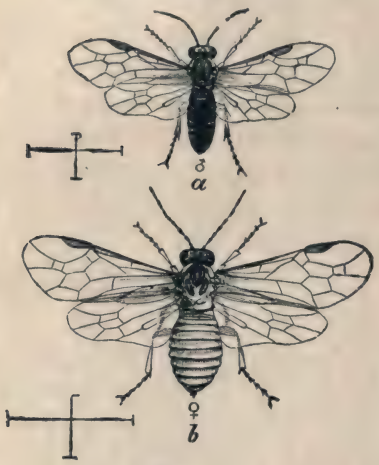

FIG. 7.

FIG. 8.

Amongst insects which every year make their presence noticeably apparent by their injuries, and thus win the distinction of being "First-class Pests" to the fruit-grower, not one, perhaps, is better known, nor, when not checked in its operations, more annoying, than the currant worm, the larval state of the imported currant saw-fly, *Nematus Ribesii*, Scop. (= N. ventricosus, Klug).

This is a European insect, which, although it has only been noticed in America for thirty years, has already spread over a large proportion of the settled parts. Early in the spring when the buds are bursting upon the currant and gooseberry bushes, active yellowish four-winged flies will be seen flying around the bushes or crawling over the unfolding leaves. These are the parents of the currant worms. The two sexes differ a good deal in appearance. At Fig. 7, they are both represented enlarged. The hairlines at the sides show their natural sizes. The male is shown at *a*. It is slightly the smaller, and is much darker in color. The head and thorax are almost black, with some dull yellow spots. The abdomen is dark above but yellow beneath and at the tip. The wings are glossy

with dark veins. The males are equally abundant with the females, but are not so often observed, from the fact that they are seldom found on the bushes, but fly near the ground and beneath the bushes as if to welcome the females when they emerge from the soil, beneath which they have passed the winter in their snug cocoons. The females are larger than the males, and of a bright honey-yellow color.

The greenish-white glossy eggs which are about $\frac{1}{20}$ of an inch in length, are laid along the main ribs, beneath the leaves of gooseberries and currants, as shown at Fig. 8 (1). As soon as the young larvæ hatch, they at once attack the leaves upon which the eggs were laid, and eat small holes, as shown at Fig. 8 (2 and 3). They are very voracious, and their growth is very rapid indeed, little more than a week sufficing for them to pass through all their stages. These characteristics added to the large number of eggs laid by each female, make constant vigilance on the part of the fruit-grower a necessity, or he will find his gooseberry and currant bushes stripped of every leaf in a few days.

When the young larvæ come out of the eggs, they are about one-twelfth of an inch in length, with large heads and a semi-translucent body. At first they all remain on the same leaf, but as they grow large they separate and spread in all directions over the bush. They are green at first, then dark blueish green, covered with small black dots, each one of which bears a bristle, and lastly, after the last moult, pale green with yellow extremities.

When full grown they spin smooth oval brown cocoons, which, however, are sometimes of a greenish white colour. Those of the summer brood are generally on or near the surface of the ground, but at a considerable depth beneath it in the brood which passes the winter inside cocoons. The chrysalis state is assumed at once in the summer brood, and the perfect flies appear in about a fortnight. The autumn brood, however, passes the winter in the larval state inside the cocoons, and the larvæ only change to chrysalises a short time before the flies appear in the spring.

Notwithstanding that this insect is attacked by a host of parasitic enemies, it is generally necessary for the fruit-grower to apply active remedies. Of these, "White Hellebore" is the best. One or two ounces of this powder mixed in a little hot water at the bottom of a pail, and then

filled up with cold water, will give a sufficient quantity of the mixture to sprinkle a large number of bushes. This is most conveniently done with an ordinary clothes whisk. The powder may also be used dry; when mixed with four times its bulk of common flour, it should be puffed over the bushes after rain, when the dew is on them, or after they have been sprinkled with water. This is most conveniently done by means of the small hand-bellows, now obtainable at all chemists. With regard to the danger of using this material, I will quote from an excellent and very complete article upon this subject by Prof. W. Saunders, which appeared in our Ent. Soc'y, of Ont. Rep. for 1871–2, p. 32.

"It has been urged against hellebore that it is poisonous, and great outcries have been made against it on this account. It is quite true that hellebore is poisonous when taken internally in quantities, but if used in the manner we have indicated, no fear need be entertained of the slightest injury resulting from it. Examined immediately after a thorough sprinkling with the hellebore mixture, the quantity on any bunch of fruit will be found to be infinitesimal, and the first shower of rain would remove it all. If it be found necessary at any time to apply the mixture to bushes where the fruit is ripe and just ready to be picked, it might then be washed in water before using, which would readily remove every trace of the powder. During the past ten years many thousands of pounds of hellebore have been used in Europe and America for the purpose of destroying this worm, and we know of no case on record where injury has resulted from its use."

Another insect of the same family, and with very similar habits to the above, is the Larch Saw-fly, *Nematus Erichsonii*, the larvæ of which are now spreading rapidly over the Eastern United States and Canada. I have received enquiries concerning it from several of our members in different provinces of the Dominion, particularly from Nova Scotia and Quebec. The eggs of this species are embedded in the soft wood of the young shoots of the tamarac when growth first begins in June. The growth is stopped on the side where the eggs are deposited, and the twig becomes distorted and is eventually destroyed. This injury, however, is slight compared with the destruction of the foliage. There are at the present moment in Canada, from the Atlantic coast as far west as Ottawa, thousands of acres of tamaracs entirely stripped of their leaves. In a later number a fuller account of this injurious insect will be given.

ADDITIONS TO THE CANADIAN LIST OF LEPIDOPTERA.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

These names I have obtained from various sources :—

Glæa inulta Grote.
Nonagria fodiens Guen.
Plusia Ni. Hub.
Acidalia insulsaria Guen.
Cymatophora humaria Guen.
Glaucopteryx cæsiata Borkh.
Botis adipaloides G. & R.
Eurycreon sticticalis Linn.

For the following I am indebted to the kindness of Prof. Fernald :—

Conchylis floccosana Walk.
Ecopsis olinaceana Fern.
Steganoptica fasciolana Clem.
Gelechia alasella Clem.
Gelechia bilobella Zell.
Gelechia vagella Walk.
Carposina cressentella Wlsm.
Blabaphanes dorsistrigella var. *flavivittellus* Fitch.

The collecting season of 1888 was, in this locality, somewhat peculiar. It opened up about the 10th of May with great promise—early moths appearing in considerable numbers. This was soon reversed—cool, dry weather setting in ; and not until the second week of June did the weather become warm enough to produce a marked development of insect life. About that time I obtained some fine moths new to me : several of them being but single specimens of a kind are yet undetermined. Fall hunting was quite productive of some kinds of good moths. I spent the first two weeks of September sixteen miles south of the city. I could find nothing of any value by hunting in daytime ; plenty would come to light when the evenings were warm ; but these were mostly so cool that it was necessary to keep the doors closed for comfort, thereby reducing my chances. It was at this time that I secured a pair of fine, fresh *Glæa inulta*, a large and handsome moth, and the first of the genus reported to have been taken in Canada. I got the name of it from Mr. Hulst, by sending to him a specimen that had been given to me by Mr. Hanham, which he had captured in Missouri.

THE NOCTUIDÆ OF NORTH AMERICA AND EUROPE.

(Second Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

2.—Sub-family *Noctuinæ*.
Tribe *Bombycoidi*.

The sub-family *Noctuinæ* embraces the typical *Noctuidæ*, and we may take the genera *Agrotis* or *Hadena* as normal forms, from which we have a mass of more or less divergent structural groups. The characters which are made the basis of generic sub-division, according to a natural system which I find most plainly indicated in the writings of Stephens and Lederer, need not delay us here, for the reason that I have exposed them in previous writings. It remains for me to briefly point out that I have changed the basis for a classification of our North American genera from that of Guenèe to that of Lederer, commencing in my first synonymical list, Buffalo, 1874, to bring them together in a preliminary shape. When, nearly thirty years ago, I commenced my study of these forms, there were not a dozen species named in any collection, public or private, in America. In my last (MS.) list are over 1,500 names, and three-fourths of this number are taken from my descriptions or identifications. This represents continuous work; for large collections were not at first in existence, and the new forms came in singly, or in small parcels, and had to be classified; so that, from this fact, the generic determinations were often tentative. Added to this, the difficulty of determining the species described by Guenèe and Walker, and the absence of illustrations, produced a state of affairs in our knowledge of the *Noctuidæ*, which the student of to-day is largely exempted from. And *la verita é la pin ingrata delle dulcinee.*

The main mass of the *Noctuidæ* falls into three divisions, or sub-family groups, only separable by their comparative form. These are: the typical *Noctuidæ (Noctuinæ)*, the *Noctuæ nonfasciatae* of Borkhausen; the geometriform *Noctuidæ (Catocalinæ)*, the *Noctuæ fasciatae* of Borkhausen; and the pyralidiform *Noctuidæ (Deltoidinæ)*. The fact that the latter are not separable from the *Noctuidæ*, and are not *Pyralidæ*, was first shown by Herrick Schæffer.

In *one* North American genus, I have shown that vein 5 is midway

between 4 and 6 on the primaries. This is contrary to Lederer's definition, and, so far, is a single instance ; vein 5 being, in all others examined by me and as laid down by Lederer, nearer 4 than 6 on both wings, while on the secondaries it is often weaker than the rest, or wanting. I do not feel sure that the neuration should absolutely guide us ; it does not seem certain that, in the species not yet examined, it will precisely agree. The absence of an accessory cell is, in the *Noctuidæ*, exceptional, and as yet it cannot here, or in other families, be used as a character, except in a general way. In the *Sarothripinæ* and *Chloephorinæ*, for instance, subfamilies of the *Bombycidæ*, it seems to be wanting, as also in some *Lithosiinæ*, i. e., *Nudaria* ; but, as a general character, it may be said to be either usually wanting or usually prevalent, until every species has been examined and the neuration compared, which is far from the case. In my papers I used it as a general character, not describing particular forms ; hence, while the statement may be modified from a larger knowledge of the neuration of all the genera and species, it does not imply a distinct error, such as was committed in the original description of the neuration of the genus *Cerathosia*, where vein 5, on hind wings, was stated to be absent, whereas it is present, and where the configuration of the accessory cell and emanating veins on fore wings were inaccurately given. The neurational distinctions given by Lederer, will not, then, positively distinguish the *Thyatirinæ*, which, in other respects, seem true *Noctuidæ*.

The sub-family *Noctuinæ*, or typical *Noctuidæ* is, then, founded on comparative form, the hind wings being usually unbanded and the body hairy or tufted. I have divided it into various tribes, founded on comparative characters, grouping about some representative genus. The first of these is the *Bombycoidea* of Authors, in which the larvæ are hairy or bombyciform, and are often singular in appearance or habit. The moths often present some resemblances to the genus *Bombycia*, and again to the *Dasychininæ*. In this tribe the head is usually sunken, the labial palpi short, often hanging (and this character marks bombyciform moths); the thorax has a posterior tuft, while the legs are unarmed. This latter character will warrant my reference of *Copablepharon* to the *Agrotini*. The caterpillars make cocoons, and are 16-footed. The European genera *Diloba*, *Eogena* and *Clidia*, with single or few species, do not seem to occur in North America. If we have a true species of *Demas* (Mr. Morrison's *Demas* is a Hadenoid form), then this European genus has a

representative, but I only know it from a description. The European genus *Trichosea* (for *ludifica* = *Diphthera*, incorrectly credited to Ochsenheimer, see Check List, 1876, p. 36) seems allied to the forms I have separated under *Charadra*, Walk. *Raphia*, Hubn, is represented by our two species, *frater* and *abrupta*—one with white, the other with fuscous or gray secondaries. Instead of *Panthea*, we have the American genus *Platycerura* of Packard, which has strong resemblances to the *Dasychirinæ*. In *Arsilonche*, we have either a representative or identical species. So far as this tribe is concerned, the resemblance between the faunæ may be considered nearly as great as in the *Thyatirinæ*.

Tribe *Apatelini*.

It seems difficult to separate the following genera from the preceding tribe. The labial palpi seem less dependent; there is still a posterior thoracic tuft, and the larvæ are still hairy or peculiar; some bore into wood or pith to pupate; a cocoon is generally made. But the form is smoother, approaching the typical *Noctuinæ*. *Diphthera* Hübn. (= *Moma* Auct., not Hübn.) has a representative species in our well-known *D. fallax*. *Apatela* Hübn, the typical genus, is resolvable into a number of groups, based chiefly on the larval form. I do not think that Butler is warranted in considering the species generically separable. He would refer the moths on this account to actually different families. But the moths are very similar in color and structure; and I consider the larvæ have undergone independent modification. The leading European groups are represented, and such species as the American *A. occidentalis*, *A. funeralis*, *A. vulpina*, described by myself, may be considered as a strictly "representative" species. The character of the genus is changed, and its limits perhaps reach with the Californian groups *Merolonche*, and the Eastern group *Eulonche*, not found in Europe. Our American forms outnumber the European three to one, and this preponderance will be found in most of the leading genera of the *Noctuidæ*, such as *Apatela*, *Hadena*, *Mamestra*, *Agrotis*, *Catocala*. Whether we can separate the *Bryophilini* as a distinct tribe, is doubtful. The passage seems to be formed by the American genera *Harrisimemna*, *Cerma*, *Polygrammate*, *Microcoelia*. These forms seem peculiar, as also the genus *Chytonix*, which follows *Bryophila*, although, I am not certain of this. Guenèe has apparently described the type as a species of *Apamea*, and thus related to *Hadena*. The thoracic vestiture is, however, more like that of *Bryophila*, a lichen-feeding genus of

which we have one Eastern species, the *Bryophila lepidula* Gr. On the whole, the resemblance of the two faunæ is here, again, quite close. Genera with single species, peculiar to each fauna, occur, but the parentage is obvious, and but small modifications seem to be offered. These first tribes of the *Noctuinæ* seem to belong to the circumpolar element in our moth fauna, with the *Thyatirinæ*. The position formerly given by me to the American *Dicopini* seems susceptible of a change. If we place the *Agrotini* where Lederer puts them, these Dicopid genera, with a claw on the front tibiæ, seem to fall in better between the *Agrotini* with spinose, and the *Hadenini* with unarmed tibiæ. They have, especially *Dicopis*, a decided resemblance to the *Hadenini*; but the larvæ are apparently unknown, and may assist our classification by offering determinative characters.

The following table will assist in giving an approximate idea of the correspondence between the two faunæ. Allowance must be made that the North American fauna is less exhaustively known :—

EUROPE.	NORTH AMERICA.
Diloba 1 sp.	
Simyra 3 sp.	
Arsilonche 1 sp.	*Arsilonche* 1 sp.
Eogena 1 sp.	
Clidia 2 sp.	
Raphia 1 sp.	*Raphia* 2 sp.
Demas 1 sp.	*Demas* 1 sp.
	Platycerura 1 sp.
Trichosea 1 sp.	*Audela* 1 sp.
	Charadra 5 sp.
Panthea 1 sp.	*Momaphana* 1 sp.
Diphthera 1 sp.	*Diphthera* 1 sp.
Apatela 15 sp.	*Apatela* 54 sp.
	Harrisimemna 1 sp.
	Cerma 1 sp.
	Microcoelia 2 sp.
Bryophila 9 sp.	*Bryophila* 3 sp.

OBSERVATIONS ON SOME NORTHERN DERBIDÆ.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

The small group of Homopterous insects included by Fabricius in his genus Derbe, but now separated as a sub-family from the other Fulgoridæ under the name of *Derboides Spinola* or *Derbida*, Stal, have always been objects of interest to students of this order, partly on account of their delicate form and peculiar structure, but their almost universal rarity has doubtless added much to their attractiveness. A series of these frail North American forms, differing in several respects from their tropical allies, were first made known in 1819 by Mr. Kirby, who arranged them under two genera—*Otiocerus* and *Anotia*, describing under the former eight, and under the latter one species; to *Otiocerus* three species from the United States were added by Dr. Fitch in 1851 and 1856, and one by Dr. Stal from Cuba, in 1859; to *Anotia* Dr. Fitch added three species in 1856. Thus, as the genera now stands, *Otiocerus* has twelve North American species, and *Anotia* four, but future study will probably result in placing two or three of these as mere varieties. As has been stated, *Otiocerus* was established by Kirby in a paper read before the Linnæan Society of London, in 1819. This paper appeared in Vol. XIII. of the Transactions, published as a whole in 1822, but probably somewhat earlier as a separate. In 1821, Germar, in the fourth volume of his *Magazin der Entomologie*, characterized his genus *Cobax* for a specimen of Kirby's *O. Stollii*, which he had received from Bahia, describing the species as *C. Winthemi*. Notwithstanding the fact that he claims the presence of ocelli for his genus, it seems to be equivalent to Kirby's *Otiocerus*, in which they are apparently absent, and is consequently placed as a synonym. In 1832, Burmeister, in his *Handbuch der Entomologie*, redescribed *O. Degeerii* as *Hynnis rosea*, differentiating his genus from *Otiocerus* by the extension of the elytra at their inner apical angles; but this character is now considered as of but subgeneric value at most. Genus *Anotia* was founded by Kirby on a single female example of *Bonneti*, and judging from a male in my collection, would seem to need modifying to include both sexes.

I propose in the present paper, after recording brief observations on a few species of *Otiocerus*, to describe a pretty little form occurring here, for which I find it necessary to establish a new genus, intermediate in character between *Anotia* and *Mysidia*.

Otiocerus Degeerii, Kirby. This, our largest species, is not uncommon here through July, August, and September. In color it varies from pale reddish to brownish purple, but always shows the white line on the suture before the appendix, and at the tip of the elytra. The antennæ, which are comparatively small, have but one appendage in both sexes. The males are a little smaller than the females, and are less frequently met with.*

Otiocerus Stollii, Kirby. One specimen, a male, beaten from an oak near this city, August 18, 1888. This small species is of the same dark color we find in the preceding. A pale rosaceous vitta occupies the vertex, the middle of the thorax, and the elytral suture, as far as the tip of the clavus, beyond which is a pale line at the base of the appendix, as in *Degeerii*. The two carinæ, which are closely approximated on the point, diverge slightly just before the apex; on the vertex they are a little arched above the eye, and their edge is finely crenated. The antennæ are larger than in *Degeerii*. This insect must have a wide distribution, as it was described from Georgia by Kirby, and from Bahia, Brazil, by Germar. It is quite distinct from the *O. Stollii* of Spinola (*Ann. Soc. Ent.*, Fr. VIII., p. 385), and of Amyot & Serville (*Hemip.*, p. 514), which Dr. Fitch considers equivalent to his *Amyotii*.

Otiocerus Coquerbertii, Kirby. This, our most beautiful, as it is our most abundant species, occurs here with *O. Degeerii* from July to Sept. on various trees and bushes, especially on the beech, maple, oak, and hickory. Its two appendages exceed the antennæ in length. In size it approaches *Degeerii*, but represents another facies of the genus; distinguished by a pale ground color, relieved by a broad vitta of red or fuscous, extending from the tip of the head across the eye and thorax, and along the elytra near the suture to the tip of the clavus, where it forks, one branch bordering the internal apical margin, the other deflected to the apex of the costa. Their wings are clear or white, immaculate, and the frontal keels are approximate on the lower part of the face. Here belong *Signoreti*, Fitch; *Reaumurii*, Kirby; *Wolfii*, Kirby; and *Amyotii*, Fitch.

(TO BE CONTINUED.)

* Since writing the above, M. Provancher has (*Petite Faune Ent. du Canada*, Vol. III. *Hemip.*, p. 217, May, 1889) described an insect as *Amphixepa (!) Coquebertii*, referring it to Kirby's species with hesitation. From his description it cannot be the *Coquebertii*, but it agrees in every particular with pale examples of *Degeerii* that not infrequently occur here, and probably should not be considered as deserving even a varietal name.

ON EARLY STAGES OF SOME LEPIDOPTERA.

BY WM. BEUTENMÜLLER, NEW YORK.

Chionobas Macounii, Edw.

EGG.—White, subglobose, slightly flattened above and below, with about seventeen longitudinal ridges, which are connected by numerous fine transverse ridges. Length, about 1.2 m.m. Width, about 1 m. Laid July 11. Emerged July 27.

YOUNG LARVA.—Head whitish, globose, rather large, finely punctured, mouth parts black. Body above bright pink, with a series of four whitish longitudinal stripes on each side; those on the dorsal region are very broad, with the intervening spaces very narrow. The lateral stripe very fine, and the one below the spiracles very broad. The spaces between these stripes rather broad. Spiracles black. At the posterior extremity of the body is a short, fork-like process. Underside of body pinkish, without markings. Length, about 2 m.m. Food-plant—Grass *(Poa pratensis)*. I very much regret not to have been able to raise the larvæ to maturity, but hope that Mr. James Fletcher, from whom I received the eggs, may have further notes upon this interesting species.

Ancyloxypha numitor, Fabr.

EGG.—Semi-spherical, yellow, rounded at the side and top, base flattened. After two days the egg became dirty-whitish, speckled with bright red. Length, about 1.5 m.m. Width, about .75 m.m. Laid on Grass *(Setaria op.)*, Sept. 8.

Arzama Obliquata, G. & R.

MATURE LARVA.—Head, subcaudate; rugose, chestnut brown, sometimes jet black; shining. Cervical shield, rugose, chestnut brown, sometimes black. Body above, shining olive brown, with numerous very fine transverse wrinkles, which are hardly visible to the naked eye; posterior segment much depressed. Spiracles black. Body beneath, dirty brownish white, including the abdominal legs, which have a chestnut brown or jet black patch on the outer side of each, and the extremities black. Thoracic feet chestnut brown or jet black. Length, about 55 m.m. Found several full grown specimens under decaying stumps, Sept., 1888.

Mailed August 1st.

The Canadian Entomologist.

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SOME TEXAS, ARIZONA AND CALIFORNIA MOTHS.

BY G. H. FRENCH, CARBONDALE, ILL.

Ameria Texana, nov. sp.

Expanse .80 inch. Of the size and shape of *A. Unicolor*; the hind wings more rounded at anal angle, in that respect more like *Euphanessa Mendica;* body slender, antennæ pectinate; palpi slender, short, projecting beyond the front less than in *A. Unicolor*. Color uniform gray drab, the wings diaphanous, antennæ concolorous except the inside of pectinations at base where they are black, sides of head, back of eyes and a little at base of fore wings and abdomen slightly ochraceous.

Described from a single ♂ specimen from Hockley, Texas, from my friend Leopold Hartmann; his number 187.

Plusia Arizona, nov. sp.

Expanse 1.50 inches. Fore wings rich, shining, metallic golden, much like greater part of the wing of *P. Howardi*. It is marked with rich purple brown in three patches; the first basal triangular, small, reaching from the costa at the base to the posterior margin about one-fourth the distance from body to posterior angle; the second costal, quadrate, extending to median vein, one-fourth from base; the third costal, subquadrate, at the end of cell, partly within and partly beyond, spreading out towards apex; all three connected by a narrow costal margin of the purple brown. Fringe purple brown, cut with paler. Hind wings whitish, fringe the same, a dark hair line at base of fringe. Thorax pale as though purple brown washed with ochraceous, the ends of tufts darker; the outer patch on fore wings washed with ochraceous in its outer part.

Described from one ♂ from Arizona. This and another specimen were collected by H. K. Morrison in Arizona a number of years ago, and have been in my cabinet ever since. The other specimen may have been destroyed, as I do not find it now. This differs from *Howardi* chiefly in having one more purple brown spot. The basal spot or patch is broadest posteriorly, coming to a point on the costa.

Plusia Lenzii, Behrens, MS.

Expanse 1.60 inches. This species is related to *P. Scapularis* Hy.

Edwards, in the position and somewhat the shape of the markings, but differs in color. General color fawn, with a purplish brown tint at the base above the cell and the basal portion of posterior margin. From the apex to the posterior angle extends a band about one-tenth of an inch wide of dark metallic golden, something of a golden sheen over the space from this band to end of wing; from the cell to posterior margin, between the t. a. and t. p. lines, in a patch that is brownish yellow, more distinctly yellow below the silver spot, this shade extending a little over the golden band at anal angle, the patch shaded with purplish brown at posterior margin near t. a. line; the most of the wing with a slight golden sheen. Silver spot short blunt boat-shaped, from median vein to fourth median veinlet. Posterior wings smoky, most prominent in terminal third.

Head and thorax fawn gray, hairs of second joint of palpi slightly rosy tipped, tufts of thorax with a brownish yellow tinge, the tips of scales of thoracic tufts and patagia lilac in side light.

Described from a single ♀ from Siskyon, Shasta county, California, taken by my friend James Behrens and by him dedicated to our our mutual friend, Dr. Henry Lenz, of Lubec, Germany.

Arctia Shastaensis, Behrens.

Since publishing the imperfect description of this form in the February number of the current volume of the CANADIAN ENTOMOLOGIST, page 35, Mr. Behrens has sent me a fine colored drawing of the specimen made before it was mutilated by travel, and from which the accompanying wood engraving was made. From the drawing I am inclined to think that it is entitled to rank as a species, as the species of *Arctia* go. It is certainly widely separated from *Achaia* by its shape and markings, and from *Behrii* by its size as well as markings. The light parts of fore wings are yellow, with a slight indication of orange; the hind wings cherry red or near a crimson with black as indicated in the illustration. The abdomen is black on the sides and centre of dorsum with a subdorsal line of red. As shown by the antennæ and abdomen the specimen is a female.

Arctia Shastaensis, Behrens. Female—natural size.

Arctia Genura, Strecker.

Among some other specimens sent me by Mr. Behrens from Soda Springs, near Mount Shasta, California, are two other *Arctias* that I am

inclined to refer to the above species. But two examples of *Arctia Genura* have, so far as I know, been taken before, one male now in Mr. Strecker's cabinet, taken by myself in Gilpin county, Colorado, at about 8,500 feet elevation, and another female in my cabinet taken at the same place by Miss Lillie Lake. If these be the same it shows a wide range for the species in the high altitudes. Both specimens have three transverse bands on the fore wings, arcuate, the first and second reaching the hind margin, but the third at a point below the longitudinal stripe. Neither has the basal half line, but one has a few pale scales on the costa the same as the female from Colorado. The light marks on the fore wings of one are yellow with a slight orange tint, the hind wings red with two rows of small black spots and a narrow terminal border; the other has the light part of fore wings yellow, less orange tinted than the other, and the hind wings yellow, but with the black the same as on the other. The abdomens are wanting, but from their appearance I take them both to be males. It is with some doubt that I refer these specimens to *Genura*, as there is no indication of a fourth or basal half transverse line except the few pale scales on the costa of the lighter one, and the spots on the hind wings of these are smaller than in the ♂ of *Genura*, as figured by Mr. Strecker; but the species of *Arctia* are generally so variable, and these come so near the typical *Genura*, that I prefer to refer them to this species provisionally to creating a new species.

Aegeria Pinorum, Behrens MS.

Mr. Behrens sends me a colored drawing and a description of an insect to which he gives the above name. It comes from Monterey, in *Pinus Insignis*, from which larvæ have been obtained. From these larvæ he bred one specimen from which the drawing was made. He says the larva lives under the bark of the tree, feeding on the inner bark and perhaps outer wood. From the wound made by the larva, there is quite a flow of resin, the pupa being formed in the inner flakes of this resin. By detaching such flakes of resin, five or six inches long, about as wide and more than an inch in thickness, pupæ and larvæ have been discovered nicely ensconced in rounded holes next to the bark.

The wings are vitreous with golden scales scattered over the surface, the veins dark; legs dark and golden; body steel blue with six golden bands, the last the terminal tuft.

Mr. Behrens did not state whether the specimen was a male or a female, but I think from the drawing it was a male.

EARLY STAGES OF GRAPTA J-ALBUM.

BY SHELBY W. DENTON, WELLESLEY, MASS.

Since the food plant and early stages of *Grapta j-Album* appear to be unknown, perhaps the following notes (incomplete as they are owing to my ignorance of the species larvæ I was rearing) may still be of some value and shed a little light on the early stages of this fine butterfly.

On May 17th of the present year, while passing a clump of white birches I noticed a leaf, on the upper surface and at the extreme end of which clustered a number of small caterpillars. They were dark brown, almost black, in color, covered with black spines and not much, if any, longer than a grain of wheat. Not knowing at the time what species of Lepidoptera they would eventually make, I simply plucked the leaf and took no further trouble to look for others, or the empty egg shells of these which must have been near at hand, as they were apparently out but a short time.

There were fifteen in all, and these were easily reared by keeping in a jelly glass, feeding with leaves of white birch until they grew too large for the glass, when they were transferred to an ordinary rearing cage. During the earlier stages they moved about very little, feeding side by side, but remaining quite motionless in the middle of the day.

Previous to moulting the last time, they became quite dormant, each one selected a leaf, covering the upper surface more or less with silk, thus partly curling the leaf, thereby hiding themselves within, and with head downward, remained in this position till the desired change took place.

In this stage, and in fact all along, no two were alike in color, although there was a general similarity between them. Perhaps they can best be described as greenish underneath, while the whole upper surface was brownish or almost black, with the exception of two yellowish or whitish lines along the back. Between the segments they were pinkish in color, with the spines along the upper surface still black and branching, those along the side having changed to yellowish green. Length at this stage, about 1½ inches and not quite as large around as a lead pencil.

In the last stage, and before pupating, the caterpillar became a translucent green, the white streaks on the back faded or disappeared, the base of the branching spines became light colored and the dark upper surface became less in extent and much paler, not so decided.

On June 7th the first one spun a button and attached itself, and by June 12th all were in a chrysalis state.

The pupa, after hardening, when held at arms length, appeared flesh colored, but on closer examination this tint was confined to the more exposed parts, and it was then seen to be of a beautiful clear green; yet they were not all alike in color, some being darker, some lighter than others, while several had a sort of bloom on them, as if dusted with flour, which gave them a whitish appearance, but all united in having six golden spots on their upper surface. Fully forty-eight hours before giving imago the colors of the future butterfly could be distinctly seen through the thin shell.

On June 20th, at 7 a. m., the first chrysalis gave a male imago, half an hour later another male followed, and by 7 p. m. nine had emerged, but of these only one proved to be a female. It was not till the butterfly appeared that I obtained positive knowledge of the species of insect I had been so fortunate as to rear, and then regretted the opportunity I had lost in taking full notes. I immediately sent one to Mr. W. H. Edwards in hopes it might reach him in the chrysalis state, and selected for this purpose the one last formed, but a postal from that gentleman a few days later informed me the imago had emerged while *en route*.

The following morning, June 21, two more had made their appearance, both females, and by 8 p. m. the remaining three, one of these proving a female, so that out of the fifteen I began with all were carried to the imago state without the loss of a specimen, except, perhaps, the one sent Mr. Edwards, which would doubtless have been perfect had it reached him in time.

I wish to call attention to the few females in comparison with the number of males (as I do not know the sex of the one sent Mr. Edwards that can be left out of the calculation), thus we have ten males and four females. That this proportion would hold good in a large number remains to be proven, but the uncommonness of the butterfly, as a rule, and the fact that none of mine were attacked by parasites, has led me to believe that it does, and possibly this may account for the scarcity of this fine insect. Also note that the males were the first to emerge.

The females can be distinguished at a glance, having the dark portion on the underside much lighter than in the male.

In conclusion :—It seems safe to say that the eggs are laid in small clusters in the latter half of April or first of May, and that search should be made for them at this time on the outermost leaves of the white birch, which is one, if not its only, food plant; that the larval state continues for at least three weeks, while that of the chrysalis about ten days.

ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

In pursuance of the call published in the CANADIAN ENTOMOLOGIST, in *Entomologica Americana*, and distributed by James Fletcher, President of the Entomological Club of the A. A. A. S., the following persons met in Toronto on August 28th, at 4 p.m.:—James Fletcher, Clarence M. Weed, A. J. Cook, L. O. Howard, John B. Smith, C. J. S. Bethune, H. Garman, W. Saunders, C. W. Hargitt, and others. Organization was effected by the election, upon motion of Prof. J. B. Smith, of Mr. James Fletcher as Chairman, and Clarence M. Weed as Secretary. Mr. Fletcher, in taking the chair, set out the advantages of organization, and urged the formation at the present time of an association that might be specially devoted to entomology in its economic aspect. Remarks to the same purpose were made by Prof. Cook, Prof. Smith, Mr. Weed, Mr. Howard, Dr. Bethune and Mr. Garman. After full discussion, Prof. Cook moved, seconded by Prof. Smith, that we do now decide to organize an "Association of Official Economic Entomologists." Carried unanimously.

Mr. Fletcher submitted a draft of a constitution drawn by Mr. Howard and himself, after consultation with others.

The proposed constitution was discussed clause by clause, amended and corrected, and finally adopted as a whole in the following shape:—

CONSTITUTION.

1. This Association shall be known as the Association of Official Economic Entomologists.

2. Its objects shall be: (1) To discuss new discoveries, to exchange experiences, and to carefully consider the best methods of work; also (2) to give opportunity to individual workers of announcing proposed investigations, so as to bring out suggestions and prevent unnecessary duplication of work; (3) to assign, when possible, certain lines of investigation upon subjects of general interest; (4) to promote the study and advance the science of entomology.

3. The membership shall be confined to workers in economic entomology. All economic entomologists employed by the general or State Governments, or by the State Experimental Stations, or by any agricultural or horticultural association, and all teachers of economic entomology in educational institutions, may become members of the Association by transmitting proper credentials to the Secretary, and by authorizing him to sign their names to this constitution. Other persons engaged in practical work in economic entomology may be elected by a two-thirds

vote of the members present at a regular meeting of the Association, and shall be termed associate members. Members residing outside of the United States or Canada shall be designated foreign members. Associate or foreign members shall not be entitled to hold office or to vote.

4. The officers shall consist of a President, two Vice-Presidents and a Secretary, to be elected annually, who shall perform the duties customarily incumbent upon their respective offices. The President shall not hold office for two consecutive terms.

5. The annual meeting shall be held at such place and time as may be decided upon by the Association. Special meetings may be called by a majority of the officers, and shall be called on the written request of not less than five members. Eight members shall constitute a quorum for the transaction of business.

6. The mode of publication of the proceedings of the Association shall be decided upon by open vote at each annual meeting.

All proposed alterations or amendments to this constitution shall be referred to a select committee of three at any regular meeting, and, after a report from such committee, may be adopted by a two-thirds vote of the members present, provided that a written notice of the proposed amendment has been sent to every voting member of the Association at least one month prior to date of action,

(Signed) JAMES FLETCHER, CLARENCE M. WEED,
A. J. COOK, E. BAYNES REED,
JOHN B. SMITH, H. GARMAN,
CHARLES J. S. BETHUNE, C. W. HARGITT.
L. O. HOWARD,

The hour being late, Mr. Howard moved an adjournment to the 29th, after the meeting of the Biological Section of the A. A. A. S. Carried.

The Association met, pursuant to adjournment, at the call of the Chairman *pro tem*, at Scarborough Heights, near Toronto, at 4 p.m., Aug. 29th; the Chairman, Mr. Fletcher, taking the chair. On motion of Prof. J. B. Smith, seconded by Mr. L. O. Howard, the reading of the minutes of the meeting of the Committee organizing the Association was dispensed with, and resolved that the members present do sign the constitution as read and approved at the last meeting, and that by their action the Association of Official Economic Entomologists be, and is hereby duly organized. The following members then signed the Constitution in the order named:—James Fletcher, Chairman; A. J. Cook; John B. Smith; Chas.

J. S. Bethune ; L. O. Howard ; Clarence M. Weed ; E. Baynes Reed ; H. Garman ; C. W. Hargitt. The Secretary was authorized to transfer the signatures to the minute book of the Association, and to add the signatures of those who had expressed a desire to join in the work of the Association.

Letters were then read from Dr. F. Goding, Illinois, and Dr. J. A. Lintner, New York, expressing sympathy with and approval of the objects of the Association, and asking to be enrolled as members.

On motion of Prof. Smith, seconded by Mr. Weed, the election of officers was then proceeded with.

Prof. Smith nominated Prof. C. V. Riley as first President of the Association, stating that his recognized pre-eminent position as an economic entomologist, and his active interest in the work of establishing this Association, entitled him to the honor and recognition of the Association by election to that office. The nomination was seconded by Dr. Bethune and Mr. Weed, each stating the high claims of Dr. Riley to the position. On motion of Prof. Cook, seconded by Prof. Smith, Dr. Riley was elected by acclamation.

Prof. Smith nominated Prof. S. A. Forbes as 1st Vice-President of the Association. The nomination was seconded by Mr. Howard, and Prof. Forbes was elected by acclamation.

Mr. Weed nominated Prof. A. J. Cook as 2nd Vice-President of the Association. The nomination was seconded by Dr. Bethune, and Prof. Cook was elected by acclamation.

Prof. Cook then took the chair and the meeting was carried on under his presidency.

Mr. Howard nominated Prof. J. B. Smith as Secretary of the Association. The nomination was seconded by Prof. Hargitt, and Prof. Smith was elected by acclamation.

On motion of Prof. Smith, the President was authorized to appoint a committee of two to prepare such by-laws as may be deemed expedient, to be submitted for aproval by the Association at its next meeting.

Prof. Cook appointed the Secretary and Mr. Howard as such committee.

On motion of Mr. Howard, it was resolved that the next annual meeting of the Association be held at the time and place where the Association of Agricultural Colleges and Experiment Stations next meets.

On motion of Prof. Smith, the Society then adjourned.

JOHN B. SMITH, Secretary.

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

The following paper is presented in order to get into shape the notes made by me at odd times for the five years last past. It includes, in the first place, all the references that I found to the species during that time, and such notes of synonymic interest as I have culled from the publications examined. It has also been my practice, as specimens came into my hands, to use such as were unfit for the cabinet, for purposes of study, and I have thus accumulated a great many notes, which I see no opportunity of using for some time to come, inasmuch as my studies on the *Noctuidæ* will probably fill very completely all the time I have for systematic work. To present these notes for the benefit of those having more time to follow these lines of study, and to rid myself of the accumulated slips and memoranda, I have put them into this form. As some of the species are not known to me in nature, and as the sequence in Mr. Grote's list is based on no natural characters that I have been able to discover, I have arranged them in alphabetical order for convenience of reference.

Family ARCTIIDÆ.

The essential characters of the family are: Ocelli present, vein 8 of secondaries arising from the sub-costal at some distance from base. The former peculiarity separates them from the *Lithosiidæ*, the latter from the *Noctuidæ*. Usually, there is an accessory cell, but there are numerous exceptions to this. Typically, the venation of primaries is Noctuidous, save that the internal vein is not furcate basally. This, however, is a weak character. The secondaries are also very much as in the *Noctuids*, save for the origin of vein 8, which in the *Arctiids*, arises from the sub-costal instead of from the base. A somewhat well marked and characteristic feature is found in the loop of primaries receiving the frenulum of the male secondaries. It is very distinct and definite, arising from the space between the costal and sub-costal veins, and generally in the form of a heavy rope or band, reaching to the median space, where it is coiled to form a distinct ring into which the frenulum is inserted. In the female the frenulum consists of a bunch of three or more fine bristles, which are received into a loop formed of crossed scales in the median space of primaries.

The front is flat, except in the *Cydosiinæ*, and the head is usually small. The tongue is variable, and quite often aborted or very weak. Thorax and abdomen are very variably developed. The antennæ furnish good characters for generic separation and sub-family groupings. They are sometimes very short, sometimes excessively long, and again moderate in length. In addition to what has been said of the venation it may be added, that two definite series are recognizable, based on the origin of vein 10 of primaries. In some genera it arises from the sub-costal before the end of the cell, in the others it is from the series at the end of the sub-costal. The legs afford good characters. The spurs of the middle and hind tibiæ are sometimes wholly or partly wanting, and sometimes the fore tibiæ are armed with spines or claws.

The genitalia will furnish excellent characters when studied. I have examined a number of species and find strong peculiarities. As the notes are too fragmentary and the characters need illustration as well as description, no reference is made to them.

Finally, it may be as well to disclaim completeness, either of references or description, though so far as the bibliography is concerned it is much more complete than anything heretofore presented.

Sub-family Cydosiinæ.

The characters of this sub-family have been given by me in the Proc. U. S. Nat. Mus., 1888, pp. 185-190. The produced tuberculate or roughened front constitute the isolating character. Vein 10 of primaries is from the sub-costal.

Genus Cydosia, Westw.

1841—Westw. in Jardine Nat. Lib., XXXVII, 193.
1854—Wlk., C. B. Mus. Lep. Het., II., 523.
1885—Moeschl., Stett. Ent. Zeit., XXXXVI., 206.
1888—Smith, Proc. U. S. N. Mus. XI., 187.

C. nobilitella, Cram.

1782—Cramer, Pap. Ex., III., pl. 264, f. G., *Tinea.*
1816—Hübner, Verz., p. 168, *Crameria.*
1841—Westw. in Nat. Libr. 37, p. 193, *Cydosia.*
1854—Wlk., C. B. Mus. Lep. Het., II., 523, *Cydosia.*
1866—H.-Sch., Corr. Blatt., XX., 119, is an *Agaristid.*

1869—Grt. and Rob. Tr. Am. Ent. Soc., II., 186, *Cydosia.*
1872—Stretch, Zyg. & Bomb., 162, pl. 7, f. 8, *Cydosia.*
1882—Smith, Proc. U. S. N. Mus., XI., 188, *Cydosia.*
imitella, Stretch.
1873—Stretch, Zyg. & Bomb., 163, et. 242, pl. 7, f. 8, *Cydosia.*
1873—Grt., Bull. Buff. Soc. N. Sc., I., 36, *Aurivitta ?*
1888—Smith, Proc. U. S. N. Mus. XI., 188, pr. Syn.
var. *aurivitta*, Grt. & Rob.
1869—Grt. & Rob., Tr. Am. Ent. Soc., II., 186, pl. 3, f. 68, *Cydosia.*
1872—Stretch, Zyg. & Bomb., 163, pl. 7, f. 9, *Cydosia.*
1888—Smith, Proc. U. S. N. Mus., XI., 188, an var. pr.

The relation of these forms to each other is fully discussed in my paper in Proc. U. S. N. Mus., above cited.

The species from Texas.

Genus CERATHOSIA, Smith.

1887—Smith, Entom. Amer., III., 79.
1888—Smith, Proc. U. S. N. Mus., XI., 189.

C. tricolor, Smith.

1887—Smith, Ent. Amer. III., 79.
1888—Smith, Proc. U. S. N. Mus., XI., 190.

The recent discussion on the location of this genus is not referred to. Vein 5 of secondaries is very faint, but yet distinctly present. In my original description, made from a fresh slide, the thin balsam had obliterated the vein. The ease with which such errors are made in the venation is illustrated by the fact that ever since Herrich-Schaeffer first used venation as a basis for family characters, *Ino* has been credited with three internal veins, by even the best European students. I was the first to demonstrate by bleaching the wings and mounting in balsam, that one of these veins was a mere fold; on the other hand, this method has the disadvantage of obscuring the recognition of weak veins, and I was caught napping in this genus. My figures of venation in the Proc. U. S. N. Mus., are from camera drawings, and vein 5 was not apparent there. The presence or absence of the vein, is, however, immaterial so far as any influence over the family reference is concerned.

The species is from Texas.

Sub-family ARCTIINÆ.

This term as here used embraces all the other *Arctiidæ*. I wish to say definitely, however, that I believe we have here at least three good sub-families, and the term is used here simply to separate off the *Cydosiinæ*, which have been properly limited.

Mr. Hy. Edwards uses the term *Pericopidæ* for the genera *Gnophœla* and *Melanchroia*, in Ent. Amer., III., 227, placing them between the families *Lithosiidæ* and *Arctiidæ*. Mr. Grote, in his "New List," placed *Gnophœla* between *Ctenucha* and *Harrisina;* genera, with which it has not even a habital, much less a structural resemblance, *Melanchroia* he omits altogether. I do not adopt Mr. Edwards's suggestion because I have not studied *Melanchroia*, and cannot find any satisfactory limit from *Gnophœla* alone. The group is rather tropical than temperate, *Gnophœla* being from the southwest and west, and *Melanchroia* still more typically southern—Key West, Mexico, Texas, Arizona. I place the two genera at the head of the series, on account of their *Lithosiid* tendencies.

Genus GNOPHÆLA, Wlk.

1854—Wlk., C. B. Mus. Lep. Het., II., 331.

1872—Stretch., Zyg. & Bomb., 35.

Omoiala, Grote.

1863—Grt., Proc. Ent. Soc., Phil., II., 334.

Lamprosina, Grote.

1863—Grt., Proc. Ent. Soc., Phil., II., pl. 6, f. 1.

Callalucia, Grote.

1866—Grt., Proc. Ent. Soc., Phil., IV., 315.

The ocelli are present, the eyes small, round and prominent, and the head as a whole, small. Tongue rather long and strong, palpi slender, drooping, with loose thin vestiture. Antennæ elongate, in the male heavily and lengthily bipectinated. Legs, subequal, smoothly scaled, the usual spurs small. Primaries with 11 veins, one of the series from the end of the sub-costal wanting, 3, 4 and 5 are from the median at the end of the cell, 5 rather close to 4, cell closed by a curved vein: 6 from the end of the subcostal on a very short stalk with 9, which runs to the apex and gives off one vein about half way to tip. Vein 10 is from the sub-costal before the end of the cell. Secondaries with 3 and 4 on a stalk from the end of the cell; 5 from a short spur cross vein, not far from the

stalk originating 3 and 4 ; a curved continuation of the cross vein closes the cell ; 6 and 7 on a long stalk out of the end of the subcostal, the stalk forking about half way to the margin ; 8 out of the subcostal about one-third from base.

The above notes are from a male, *G. hopfferi.* The exact relation of the very variable forms of the species is not at all settled, and there may be more or fewer species than are now recognized.

G. hopfferi, Grt. & Rob.

1867—G. & R., Tr. Am. Ent. Soc., I., 332, *Gnophœla.*
1872—Stretch,* Zyg. & Bomb., 38, 236. pl. 2, f. 2, *Gnophœla.*
1881—Butler, Papilio, I., 129, *Gnophœla.*
1882—Stretch,* Papilio, II., 82, *Gnophœla.*
var. *discreta*, Stretch.
1876—Stretch, Lep. Wheelers Exp., V., 802, *Gnophœla.*

arizonæ, French.

1884—French, Papilio, IV., 2c, *Gnophœla.*
1884—French, Papilio, IV., 112, = *discreta.*

Stretch gives the food plant as *Myosotis*. The insect has been taken in California, Arizona and Oregon (May 7 to June 1).

G. latipennis, Bdv.

1852—Bdv., Lep. Cal., Ann. Soc. Ent. Fr., 2nd ser., v. X., 320, *Glaucopis.*
1862—Morris, Synopsis Lep., 136, *Glaucopis.*
1872—Stretch, Zyg. & Bomb., 38, = *hopfferi.*
1882—Grote, New List 14, on sp. dist.
Habitat—California.

It is highly probable that Mr. Stretch is correct in referring *hopfferi* to this species ; but as Mr. Grote still lists them as distinct, and I have not studied the forms myself, I follow Mr. Grote for the present.

G. vermiculata, Grote.

1863—Grt., Proc. Ent. Soc., Phil., II., 334, pl. 6, f. 1, *Omoiala.*
1865—Grt., Proc. Ent. Soc., Phil., IV., 316, *Callalucia.*
1867—G. & R., Tr. Am. Ent. Soc., I., 332, *Gnophœla.*

* This sign, whenever used with a reference, as above, indicates that the early stages were referred to.

1872—Stretch, Zyg. & Bomb., 36, pl. 2, f. 1, *Gnophæla.*
1881—Butler, Papilio, I., 130, *Gnophæla.*
1888—Bruce,* Ent. Amer., IV., 24, *Gnophæla.*
var. *continua* Hy. Edw.
1881—Edw., Papilio, I., 80, *Gnophæla.*
Habitat, Colorado.

Mr. Bruce gives the food plant as *Mertensia virginica*, and the date in the Upper Platte Canon as July. The probabilities are that the species is double brooded, the first brood appearing in May, the larva of the second in July, imago late in July and early August.

Genus MELANCHROIA, Hübner.
1816—Hübner, Verzeichniss, 173.
1854—Walker, C. B. Mus. Lep. Het., II., 386.
1862—Clemens in App. to Morris Syn., 297.

This genus I have made no study of, although there is considerable material in the National Museum available for that purpose. Mr. Grote never included the genus in his lists and apparently considered it extra territorial. It is only within quite recent years that it has been placed by Mr. Edwards among the genera of our fauna, though Mr. Stretch recorded it in 1876 as found in Arizona. It is really a stranger to the rest of our fauna—an intruder from Central America—but it seems necessary to include it.

The bibliographical references to the older authors are all at second-hand, as, at the time I was studying their works and making notes, the species were not recognized as belonging with us. This is, perhaps, a good place to mention that, except where otherwise stated, all the references have been verified, and, barring errors in transcription and type, are correct.

M. cephise, Cramer.
1782—Cram., Pap. Ex., IV., 182, pl. 381, f. E., *Phalæna.*
1816 (?)—Hübner, Samml. Ex. Schm., II., Sphing, 17, ff. 1-4.
1816—Hübner, Verzeichniss, 173, *Melanchroia.*
1854—Wlk., C. B. Mus. Lep. Het., II., 387, *Melanchroia.*
1862—Clem., App. to Morris Syn., 298, *Melanchroia.*
1886—Edw., Ent. Amer., II., 9, *Melanchroia.*
Habitat—Texas, Arizona, Mexico, West Indies.

M. geometroides, Walker.

1854—Walk., C. B. Mus. Lep. Het., II., 357, *Melanchroia.*
1886—Edw., Ent. Amer., II., 9, *Melanchroia.*
Habitat—Key West, Fla., West Indies.

There are quite a number of specimens of what I take to be this species, in the National Museum, from the Morrison collection, but they have not been as yet incorporated into the systematic series.

M inconstans, Geyer.

1837—Hüb., Zutræge, No. 431, ff. 861-862, *Melanchroia.*
1854—Wlk., C. B. Mus. Lep. Het., II., 389, (?) *Melanchroia.*
1860—Clem., App. to Morris. Syn., 298, *Melanchroia.*
1876—Stretch., Rept. Lep. Wheeler Exp., V., 802, *Melanchroia.*
secreta, Wlk., Cat. Lep. B. M., 222, supp., *Ardonia.*
1876—Stretch, Rept. Lep. Wheeler Exp., V., 802, pr. syn.
Habitat—Mexico, Arizona.

The synonomy is from Stretch, as are the bibliographical references to Walker.

Genus DARITIS, Walker.

This is also a recent addition to our fauna, made by Mr. Edwards. The Mexican form is not uncommon in its home, but the variety described by Mr. Edwards seems rare ; at all events there have been very few specimens brought in. I have made no notes on this genus.

D. thetis, Klug.

1836—Klug., Neue. Schmett., IV., f. 1 and 2, *Euprepia.*
1886—Edw., Ent. Amer., II., 165, *Daritis.*
var. *howardi*, Edw.
1886—Edw., Ent. Amer., II., 165, *Daritis.*
Habitat—New Mexico, southward.

I have given none of the bibliography for the original species, as Mr. Edwards's description covers both species and variety.

From this point the order observed in Mr. Grote's list of 1882 is followed, not from any conviction that it is the best arrangement, but because it is easiest, and because for the present purpose any order will answer equally well.

(To be continued.)

OBSERVATIONS ON SOME NORTHERN DERBIDÆ.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

(Continued from page 159.)

Otiocerus Wolfii, Kirby. A pale specimen of this frail little form was beaten by me from a beech tree September 3, 1888, at Lancaster, N. Y., and Mr. Uhler has kindly sent me a fully colored individual, presumably from Md., taken on the 6th of August. The antennæ in this species are very short, with a single appendage.

Otiocerus Signoreti, Fitch. I am indebted to Mr. W. J. Palmer, jr., for an example of this species, captured at Lancaster, September 14, 1888. It agrees with *Wolfii* in having but one appendage to the rather small antennæ. The white wings are faintly tinted with red and beautifully veined with the same color.

Amalopota, new genus.*

Form very slight. Head rather short, horizontal above, almost vertical before, with superior and frontal keels about as in *Anotia;* apex obtuse. Eyes of medium size, emarginate below. Ocelli two, distinct, placed below and very near the inferior angles of the eyes. Antennæ about as long as the head, situated at the base of the clypeus in a socket formed by a sharp, slightly elevated ring; basal joint very short and annular; second joint diverse in the two sexes; in the male, much flattened, with the sides almost parallel; in the female, shorter and slightly flattened; in both sexes papillated, with a subterminal emargination, from which springs a bristle. Clypeus triangularly ovate, convex. Rostrum long, reaching to about the middle of the venter; terminal joint very short. Prothorax linear above, produced in an acute angle between the eyes; on the sides, suddenly expanded to a broad, thin scale. Humeral scales large and prominent. Legs slender, unarmed, of medium length; the posterior femoræ somewhat thickened; posterior tarsi three jointed; basal joint longer than the second and third united. Elytra long and narrow, widest at the inner apical angle; apex broadly rounded, a little retreating posteriorly; the costal area expanded near the base into a broadly rounded, slightly recurved lobe; a slight constriction of the costa just before the apex, with a thickening of the veins there, produces the appearance of an imperfect stigma. Venation simple,† almost as in

* From:—αμαλος feeble, and ποτη flight.

† For convenience of comparison I have used Mr. Westwood's nomenclature of the venation.

Anotia; costal area rather broad; mediastinal vein forked at the basal third; costal branch sending about two veinlets to the costa in the stigmatal region, and united by a cross vein to the outer fork of the inner branch, which is straight and twice forked just before the apex. Post-costal vein joining the mediastinal near the base and running straight to the apex of the elytra, parallel to the inner branch of the mediastinal vein; the long, straight cell thus formed is crossed by two veinlets, one at the apical third, the other near the apex. A cross vein joins the post-costal with the median vein near the middle of the elytra, beyond which the former sends five branches to the inner apical margin, the basal two of which are themselves forked near their apex, and united by a zigzag submarginal vein that reaches the claval suture; at this submarginal vein terminate the anal and the two branches of the median vein. The apical forks of the post-costal vein are united by slender cross veins, which with this submarginal vein form a series of about twelve apical and marginal areoles from the semi-stigma to the clavus. Wing:—Mediastinal vein simple, near the costa, which it touches at about the middle; post-costal vein bifid before the apex, and united by a cross vein to the mediastinal and median veins, the latter of which is also bifid. Abdomen short and broad, with a dorsal carina; showing five segments above and four beneath.

The vertex and front are so compressed into the superior and frontal keels that they might not improperly be described as wanting. These keels, as in *Anotia*, are united on the front and divergent posteriorly on the vertex, the included space being cut out to receive the pronotum. The mesonotum is convex and lozenge-shaped, the length scarcely greater than the width, which greatly exceeds that of the head; with three dorsal carinæ. Four anterior coxæ long and slender, placed obliquely; posterior short and thick. Base of the femoræ approximate. The genital pieces scarcely differ from those of *Otiocerus*.

This genus differs from *Anotia*, to which it is perhaps most nearly related, by the presence of ocelli, the greater length of the rostrum, the smaller number of veins in the stigmatal region, etc.; from *Patara* by the presence of ocelli, the greater length of the rostrum, the shape of the head and thorax, and the venation; from *Mysidia* and *Derbe* (Westw.), it differs in the single frontal carina, in the shape and venation of the wings and the form of the eyes, but agrees with the latter genus in the

presence of the costal constriction (although less pronounced), and the length of the rostrum. The only genus described by Stal to which it need be compared is *Hulcita*, from which it is sufficiently differentiated by the presence of ocelli, the form of the vertex, antennæ, etc.

Amalapota Uhleri n. sp. Pale sanguineous. Elytra transparent, with the basal third and a broad band before the apex fuscous, the latter marked with sanguineous toward the costa. Whole insect, when fresh, covered with a white bloom, most conspicuous on the face and abdomen. Length—To tip of abdomen 3 m.m., to tip of elytra 8 m.m.; expanse of wing 15 m.m. Head—Keels of the front and vertex, viewed from the side, gently and regularly arcquated; vertex narrow, almost entirely cut out between the keels to receive the pronotum, which extends forward nearly to the middle of the eyes; extension of the frontal keels before the eye a little less than the width of the eye in the female, about half the width of the eye in the male. Rostrum extending to the third ventral segment, the last joint scarcely longer than wide. Antennæ of the female reaching to the tip of the head; second joint somewhat compressed, a little widened at the apex, which is obliquely and concavely truncated for the reception of the seta; in the male this second joint is a little longer and wider than in the female, and is much compressed, with the margins slightly thickened and the surface more distinctly papillated; a minute notch, almost at the end, bears a bristle a little longer than the width of the joint. In fresh examples, the *Ocelli* are liable to be obscured by the white bloom on the cheeks.

Thorax—Prothorax widened to an almost quadrangular scale behind the eye; central carina of the mesonotum inconspicuous; lateral carinæ almost obsolete. Elytra, when closed, extending about two-thirds of their length beyond the abdomen; basal lobe-like tooth minutely denticulate on its edge.

General color sanguineous. Head, thorax and antennæ fulvous, the latter suffused with pale sanguineous within the margin in the male; this color also invades the frontal keel, especially in the female. Keels of the vertex crested with white. Eyes dark brown. Clypeus pale fulvous. Rostrum white, tip black. Legs clear whitish, the posterior femoræ more or less invaded with sanguineous. Coxæ fading and white toward their tips. Abdomen in the male sanguineous, the basal ventral segments paler; in the female deep sanguineous, or even brownish-purple, darker

along the crest; posterior edge of the ventral segments and genital pieces pale, the valves above fulvous.

Elytra transparent; basal third smoky-brown, omitting the humerus and costal region; a broad brown band occupies the apical third of the costa, and narrows to about one-half this width at the internal apical angle; this band includes a clear spot on its costal base, and omits about six of the apical areoles. In the female, this costal, clear spot is much larger than in the male, and coalesces with the clear, apical areoles. The veins are sanguineous within the limits of the brown, apical band, and in the stigmatal region are broadly bordered with the same color; this color also appears in the veins of the basal brown patch in deeply colored examples. Wings clear, with a smoky tip, and a larger, slightly suffused, area at the base.

Described from five individuals—a pair taken *in coitu* Sept. 3rd, 1888, two females taken the same day, and another female taken by W. J. Palmer, Jr., of this city, a week later, all at Lancaster, N. Y. Three of these were beaten from maples, and two from uncertain trees—probably maple or beech.

I take pleasure in dedicating this beautiful little species to our leading American Hemipterist, Mr. P. R. Uhler, whose disinterested and unfailing kindness has been an inspiration and help to me in my studies of these insects.

CORRESPONDENCE.

GRAPTA J-ALBUM.

Dear Sir: Having heard that the larvæ and food-plant of *Grapta j-album* were unknown, I thought that I should do well in informing you, since you could best make known my little discovery, that I have bred the butterfly from young larvæ, which fed on silver birch *(Betula papyrifera)*. Not knowing what they were, I neglected to make a long or careful description of them; nevertheless, I hope the following observations may be of some value:—The larvæ were black, with two dorsal, two sub-dorsal and two super-stigmatal rows of white spots and smudges, three or four on each segment,* with one dorsal and two sub-dorsal rows of shining black, branching spines; two super-stigmatal rows tipped with red, and two sub-

* There were also other smaller white spots scattered over the body.

stigmatal rows pale red. Underneath yellowish-green, and in some places reddish, speckled with white; 12th segment reddish, both above and below; head black, and covered with many hard, white, conical tubercles, or short spines; somewhat cordate, with two thick, black, branching spines at the upper corners like horns. The chrysalids were about one inch long, pale green or light brown, sometimes with a reddish tinge, with two sub-dorsal rows of tubercles, eight in each row, the first six of these being bright, shining silver (in some lights gold) in colour. Like the other Grapta chrysalids, they were suspended by a button of silk at the tail. Before the imagos appeared, the colour and venation of the wings could be seen through the transparent outer covering. I found them on the 26th of May, 1889, when they were about eight inches long. On the 9th of June, they were two inches long. They moulted three times, and their appearance remained almost unaltered. They hung themselves up on the 13th of June, being then about 2.25 inches long, and on the 14th transformed. The imagos appeared on the 29th and 30th of June. I had altogether eight of these larvæ. The following is a description of a variety of the same larvæ taken at a later date:—On the 16th of June, I found the larva feeding, like the former batch, on the silver birch. Length about one inch. On the 17th it moulted, after which it was 1.5 inches long; colour purplish white and amber, with a dorsal band of white clouds, and some on the sides; white underneath; one dorsal, two sub-dorsal, two super and two sub-stigmatal rows of branching spines on segments 4 to 11, 2 to 11, 2 to 12 and 2 to 11 respectively. These spines were supported by tubercles, and the dorsal, sub-dorsal and super-stigmatal were black, except the last two super-stigmatal; the rest were yellow and white. Head somewhat cordate and pale white, with two black branching spines at the upper corners like horns, and covered with small conical tubercles; upper corners black, and a dark mark like an inverted V over the jaws. On the 23rd it moulted again, after which it was light green, with two dorsal bands, more or less distinctly separated, of white clouds, and some white lateral markings; spines black, except the super-stigmatal, which were brown and amber, and the sub-stigmatal, which were pale green and white; the spine tubercles were orange yellow; head white, and covered with small, white, conical spines; spiracles black. It was largest at the 7th segment, segment 1 being very small; length about 1.75 inch. The chrysalis (June 29th) was green, with a rosy tinge and rosy markings, and with two dorsal rows of tubercles, 16 in number, the first six being shining silver in colour; about one inch long, with a large dorsal lump and two smaller lateral ones, and two at the head; black markings on last segment. On the 9th of July the imago appeared. Note that in this, and in the former description, the head is *not* counted as the first segment.

PERCY M. DAWSON, Montreal.

Mailed September 6th.

The Canadian Entomologist.

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THE ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held in the lecture room of the new Biological Building of the University of Toronto, on Tuesday, September 3rd, 1889. The President, Mr. James Fletcher, of Ottawa, took the chair at 11 o'clock a.m. The following members were present:—Mr. E. Baynes Reed and Mr. J. M. Denton, London; Mr. J. Alston Moffat, Hamilton; Dr. Brodie, Dr. White, Masters O. and W. White, Mr. Gamble Geddes, Mr. A. Blue (Department of Agriculture), Toronto; Rev. C. J. S. Bethune, Port Hope; Mr. W. H. Harrington and Mr. R. Bell, Ottawa; Mr. H. H. Lyman, Montreal; Rev. T. W. Fyles, Quebec; Rev. W. A. Burman, Winnipeg; Mr. L. O. Howard, Assistant Entomologist, Department of Agriculture, Washington.

The minutes of the previous meeting having been printed and circulated among the members, reading of them was dispensed with, and they were duly confirmed.

The President then delivered his annual address, in which he referred especially to the chief insect attacks of the year. It will be printed in full in the Annual Report of the Society. A cordial vote of thanks for his able and interesting address was unanimously voted to the President on motion of Dr. Bethune, seconded by Mr. Reed.

In the discussion which followed Dr. Brodie stated that he had found several cereals injured by Thrips; he discovered what were probably the larvæ of Thrips feeding under the sheath on culms of grass, but when kept over night no specimens would be found in the morning. He and Professor Wright had examined the insects and came to the conclusion that they were Thrips. The larvæ were exceedingly difficult to mount for the microscope; if preserved in balsam they soon faded out and became useless, but better results followed the use of glycerine. He was satisfied that there are two broods in the year, the first being early in the season. This year, owing to dry weather, they were very abundant

in waste places, and he found about one-half of the timothy destroyed by them; after the rain set in the injury was very much reduced.

Mr. Geddes spoke of some variations in size that he had observed in the common yellow butterfly, *Colias philodice*, and expressed his opinion that the large specimens fed on clover and the small on lucerne.

Mr. Howard (of Washington) gave an account of the success which has attended the efforts of Dr. Riley and himself to introduce parasites of the Fluted-Scale insect (*Icerya purchasi* Maskell), a very destructive creature in California. This noxious insect had appeared very suddenly in the State, from where no one knew. Experiments were made upon it, and remedies proposed, but the cultivators did not seem to care to make use of them on their plantations. They then set to work to learn its life-history, and soon found that it came from Australia. They corresponded with Mr. Percy Crawford regarding it; he found the insect in Australia, but it was not at all abundant; they concluded, therefore, that it was kept in check by parasites. A dipterous parasite was found by Mr. Crawford. Their next proceeding was to send Mr. Koebele to Australia. He found the insect everywhere, and observed that it was very commonly parasitized. He then sent over about 15,000 living specimens of parasites; these were liberated at Los Angeles. He also found a "Lady-bird" (*Cocinella*) feeding on the scale-insect, and sent several thousand of them. The result has not been satisfactory with the dipterous parasite, as it breeds too slowly, but one of the species of Lady-birds breeds most rapidly, and will no doubt keep the pest within due bounds. As an instance of this he mentioned that 400 Lady-birds were sent to one planter, Colonel Robins, in May last; he thought from their satisfactory work that his orchard would be free from the pest by the close of the summer, but he afterwards wrote to say that on the 15th of August there was not one living scale-insect left. The experiment had been entirely successful. Mr. Howard also referred to the importation of the parasites in 1883 of the cabbage-butterfly, *Pieris rapæ*.

Dr. Bethune gave an account of his attempt to import from England many years ago the parasites of the wheat midge, and of the failure of the effort.

Dr. Brodie was strongly of opinion that noxious insects should be fought by means of parasites; that this was the true scientific method,

and that the use of poisons was a grave mistake. He was very much gratified with the account of the methods adopted at Washington, and hoped that they would be developed to the utmost.

Mr. Fletcher, in reply, said that we could not possibly ignore the great value of poisons as remedies against noxious insects ; that it was absolutely necessary to use them until we can depend upon the parasites ; and that even if we had the parasites at work upon our destructive insects they might at any time be swept away through a mildew or blight, and we should be left at the mercy of the enemy. He had been in correspondence with Mr. Whitehead in England in order to procure the parasite of *Diplosis*, but unfortunately this gentleman was ill and unable to carry out the project. He had found nearly all the specimens of scale-insects *(Aspidiotus)* sent to him from British Columbia were parasitized, but had never found one affected in this way in Ontario.

Dr. Brodie thought that the farming community could never be brought to adopt scientific methods for the protection of their crops till they had suffered from a sweeping destruction. He referred, as an example, to the ravages of the wheat midge some years ago. In the County of York it wrought so much havoc that the wheat fields were deserted and left to the cattle ; a day's threshing would produce two bushels of midges and no grain. When their crops were all destroyed then they were willing to resort to remedies, chief among which were the employment of the "midge-proof wheat" for seed, a judicious rotation of crops, and planting too early or too late to suit the habits of the midge. The introduction of new varieties of wheat was the principal means of getting rid of the pest. He wished that the farmers might lose all their potatoes in order that they might be led by this severe lesson to give up the use of Paris green and adopt scientific means of saving their crops.

After some further discussion, in the course of which the value of various poisons, such as arsenical preparations, hellebore, kerosene, etc., in checking insect ravages was insisted upon, the subject dropped.

Dr. White exhibited to the meeting some cheap wood cuts in outline of botanical subjects that were used in illustration of popular articles in "School Work and Play," and recommended that something similar should be done in order to popularise entomology. He said that specimens were first photographed upon zinc plates instead of glass, and, in

this way, by a special process, blocks were prepared for the printer at a very trifling expense. The project was heartly approved of, and it was agreed on all sides that much valuable instruction might be disseminated in this way.

Mr. Burman related his experience of injury to cattle and dogs by flies in the Northwest, and asked whether fish-oil would be a remedy. In reply, Mr. Fletcher and Mr. Howard stated that fish and other oils and grease were effective, both in keeping off the flies and in healing the affected parts.

The meeting then adjourned till the afternoon.

AFTERNOON SESSION.

The report of the council, the audited financial statement of the Secretary-Treasurer, and the report of the Librarian were presented and read to the meeting, and, on motion, were duly discussed and adopted. Mr. Moffat spoke of the large amount of work and the great care which Mr. Reed had bestowed upon the library during many years past, and of the excellent position into which it was now brought. He moved that "The thanks of the Society be given to Mr. Reed for his services in the library, and that the Executive Committee be hereby recommended to consider the possibility of shewing, in some pecuniary way, their recognition of his labors." Mr. Geddes, in seconding the resolution, which was duly carried, referred in warm terms to Mr. Reed's efficiency and kindness in connection with the library. It was suggested, in the discussion that followed, that a catalogue of the books should be prepared, and that by-laws should be framed for the proper regulation of the library and the issue of books to members of the Society. Mr. Denton said that there were now about eleven hundred volumes in the library, many of them being very rare works on entomology and other departments of science; he thought it most desirable that members out of London should be enabled to know what books there were, and under what conditions they might borrow them. Dr. Brodie spoke of the great importance of having a complete catalogue made of all the libraries in Ontario, and said that he considered it a work that might very well be undertaken by the Provincial Government. Mr. Reed thought that we were still in too crude a state to publish a catalogue of the Society's Library, but we might

make a beginning by issuing lists of the books in its different departments. It was finally agreed to leave the matter in the hands of the Librarian.

Mr. Lyman read his report as delegate to the Royal Society of Canada. Mr. Reed, in reply to an enquiry, gave an account of what had been done during the past year with regard to the Society's rooms and collections ; he stated that they had frequently been opened to the public, and that many very pleasant evenings had been spent among the microscopes, books and cabinets.

Mr. Reed drew the attention of the meeting to the changes in "The Agricultural and Arts Act," affecting the Society, made during the last session of the Ontario Legislature, and moved, seconded by Dr. Bethune, "That in accordance with the provisions of section 67 of the Agricultural and Arts Act, as amended in 1889, the agricultural divisions in Schedule A of the said Act be grouped into the following five divisions, for the purpose of electing one person from each of said five divisions (who shall be a resident of the district he represents) as directors of the Entomological Society of Ontario :—

Division 1,	to comprise	Agricultural	Divisions	1, 2, 3.
" 2,	"	"	"	4, 5, 13.
" 3,	"	"	"	6, 10.
" 4,	"	"	"	7, 8, 9.
" 5,	"	"	"	11, 12.

And that this grouping of the Divisions be in force until otherwise altered or re-arranged at any annual meeting of the Society."—*Carried.*

The following gentlemen were elected officers for the ensuing year :—

President—Rev. C. J. S. Bethune, M. A., D. C. L., Port Hope.
Vice-President—E. Baynes Reed, London.
Secretary-Treasurer—W. E. Saunders, London.
Librarian—E. Baynes Reed, London.
Curator—Rowland Hill, London.
Directors—Division 1—W. H. Harrington, Ottawa.
" 2—J. D. Evans, Sudbury.
" 3—Gamble Geddes, Toronto.
" 4—J. Alston Moffat, Hamilton.
" 5—J. M. Denton, London.

Editor of the CANADIAN ENTOMOLOGIST—Rev. Dr. Bethune, Port Hope.

Editing Committee—James Fletcher, Ottawa; J. M. Denton, London; Rev. T. W. Fyles, Quebec; Dr. Brodie, Toronto.

Delegate to the Royal Society of Canada.—H. H. Lyman, Montreal.

Auditors—J. M. Denton and E. B. Reed.

Mr. Moffat, who had been engaged for some time past in re-arranging the Society's collections, spoke of the desirability of printing a new list of Lepidoptera for labelling purposes. Dr. Bethune said that he did not think it advisable to do so just now, as the nomenclature of the order must be considered to be in a somewhat transition state; he thought that after Mr. Scudder's magnificient work on the butterflies was completed, and students had time to master its contents, there would be a very general adoption of many, at any rate, of his generic titles, and that this would alter very much our current nomenclature. He also referred to Prof. J. B. Smith's contemplated monograph of the Noctuidæ, the frequent descriptions of new species by Mr. Hulst and others, and the work of Prof. Fernald among the Micros, as rendering the publication of a list premature at present. He said that he had in his possession a new check-list of the Noctuidæ by Mr. Grote, but its publication was deemed unwise owing to the foregoing considerations. He thought that Mr. Moffat's object could be met by printing a few sheets to supplement the lists published a few years ago by Dr. Brodie and Dr. White.

Papers were then read by (1) Dr. Brodie, on "Gall Insects;" (2) the Rev. T. W. Fyles, "Some notes on the Effects of Heat on Insect Life;" (3) Dr. Goding, "In Memoriam: George John Bowles." These papers will be published in full in the Annual Report.

The Rev. W. A. Burman, of Winnipeg, was elected a member.

After spending some time in the examination and discussion of various specimens brought by members, the meeting adjourned to meet in London next year.

ERRATUM.—In the description of the larva of *Grapta j-album*, by Mr. P. M. Dawson, in the September number, there occurs the obvious mistake (page 180, line 12) of "eight inches long" instead of ".8 inch."

A NEW CLOTHES BEETLE.

BY PROF. A. J. COOK, AGRICULTURAL COLLEGE, MICHIGAN.

One of the most interesting studies of the scientific entomologist—more interesting because of its economic importance—relates to variation of habits of insects, consequent upon variation in their environment. The carpet beetle, *Anthrenus scrophulariæ* Linn., feeds on flowers in its native Europe. In the new atmosphere of America, it feeds and thrives upon carpets, shawls and other woollen goods. The apple maggot, *Trypeta pomonella*, feeds upon our wild haw and other wild fruits. Civilization exterminates its old-time aliment; and it betakes itself to our apples, cherries and plums. The curculio, apple-tree borers, bark lice, etc., are other illustrations of the same truth.

In the past season I have discovered another illustration in the *Lasioderma serricorne* Fab. This insect belongs to the family *Ptinidæ*, a small family of very small insects. Very few of the insects of this family are noxious; the two best known of which are, the apple-tree twig borer, *Amphicerus bicaudatus* Say., which bores in the mature state in the twigs of the apple, and *Linoxylon basilare* Say, which attacks the hickory and grape. The insect in question, *Lasioderma serricorne* Fab., has been found to attack plush furniture. The larvæ, in this case, do the mischief; they perforate the plush, making it like a sieve. I know of several pieces of upholstered furniture utterly ruined by these minute larvæ.

The beetle is light-brown in color. There is little variation in the color, except that the eyes and tips of the elytra are black. The wing-covers appear a little lighter, because of a covering of light hairs, which are more dense on the elytra than on the thorax and head. The thorax bends down, so that, as we look from above, we can not see the head. The serrate antennæ, which give its name to the beetle, are also bent under the head, so as to rarely show. The beetle is very small, hardly more than 2 m.m. long. The elytra are non-striated. The first two joints of the antennæ are small. They then increase to the sixth, and then decrease to the end. The tenth, or last joint, is rounded. The grubs are short, curled and hairy. They are two m.m. long and one thick. The color is white, and the hairs nearly white. These latter have a slightly yellowish tinge. The six thoracic legs are tipped with black. The upper part of the head shows four yellowish-brown lines. The upper ones are

narrowest, while the lateral ones are abbreviated behind. The front of the head is brown, while the jaws and other mouth parts are nearly black.

Like all insects, these beetles, both as larvæ and imago, are very susceptible to gasoline or bi-sulphide of carbon. Both of these, used in large quantities, were quickly fatal to the insects. Like the carpet beetle, they infest upholstered furniture between the folds, especially where the back joins the seat. It is easy to drench such parts of a sofa or chair with gasoline and destroy the larvæ of either moth or beetle.

Nearly every year brings examples of such change of habits as described above. Such incursions, present and prospective, emphasize the importance of thoroughly-trained entomologists in every state of our country.

THE NOCTUIDÆ OF EUROPE AND NORTH AMERICA.

(Third Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Tribe *Agrotini.*

The tibiæ are usually all spinose, the eyes naked, the body untufted, the form normal, the male antennæ of various structure, pectinated, brush-like, simple. The European species are referred by Lederer all to one genus, *Agrotis* of Hübner. Nevertheless, I think the yellow-winged forms may well be separated under *Hiria* and *Tryphæna*. Of these yellow-winged forms, with flattened abdomen, we have only one *T. Chardinyi*, from Anticosti and Maine, considered identical with the Siberian species of the same name, described originally by Boisduval under *Anarta*. For the structure of *Agrotis*, I refer the student to a paper of mine on the genus, CAN. ENT., XV., 51. This genus seems of general distribution, although, perhaps, most numerously represented by species in North America. To this tribe, I would refer certain American genera, with few species, which seem peculiar. These are: *Carneades*, which differs by a frontal tubercle; *Richia*, which resembles *Ammoconia* in having a thoracic rigid tuft, but has simple antennæ; *Adita*, with a claw on front tibiæ; *Agrotiphila*, with narrowed eyes; *Anytus*, with lashes; the peculiar genus *Ufeus*, and, finally, *Copablepharon*, which has some

resemblances to the *Heliothians*, and superficially recalls *Arsilonche*. The position of some of these genera is debatable, and the immature stages almost entirely unknown. We may briefly compare the European and American representatives of *Agrotis*. In Europe, about 120 species are known; we have a preliminary list of over 200. Divisions of the genus into groups have been proposed on peculiarities of the genitalia, which seem convenient, but are probably of less importance than the armature; hence, I would prefer to divide the genus, primarily, into two groups, the species with unarmed fore-tibiæ, and those with all the tibiæ armed. When all the species are compared, there will probably be found peculiarities in the armature of the front tibiæ to warrant further divisions. The relationship of the American species to the European is evidenced by the identical forms, *i. e.*, *baja*, *ypsilon*, *plecta*, *sancia*, etc., then by the representative forms, *i. e. haruspica*, *phyllophora*, etc. The species from the west coast have largely a European facies; the Labrador species are found, with other Arctic forms, on the summit of Mount Washington. We may regard this genus as of very general, pre-glacial distribution; but evidently a greater number of species feed, in the larval condition, upon plants now found in temperate latitudes. Setting the question of the allied genera with mostly few species aside, the affinity of the two faunæ is quite evident. It is a little singular that the yellow-winged forms are so feebly represented in North America. Their presence gives a somewhat peculiar aspect to the European fauna. The occurrence of yellow-winged species is not unusual in the *Noctuidæ*. We find them in *Oncocnemis*, *Hadena* and *Anarta* among usually fuscous species.

Tribe *Hadenini*.

Leaving the *Dicopid* genera, which seem peculiar, we now come to a group of typical Owlet moths, which differ from the *Agrotini* mainly in their usually unarmed tibiæ and tufted, rougher, body covering. In the first genera, the eyes are hairy; in *Fishia*, the tibiæ are spinose; in *Copimamestra*, the front tibiæ have a claw. This latter genus is founded for the European *brassicæ* and its American representative *occidenta*. *Mamestra* is a typical Hadenoid genus with hairy eyes, and *Dianthœcia* merely differs by the external ovipositor. These two genera, or generic groups in our fauna, show a similar relation to the European fauna as with *Agrotis*. Whether our *trifolii (albifusa)* is identical with the European, may not be certain, but the genus has several representative species

such as *nimbosa*, *atlantica*, *subjuncta*, etc. In *Dianthœcia*, we have *D. bella*, which represents the European *D. Magnolii*. America has the usual preponderance of species, over seventy, while Europe has fifty-eight of the two together. In my lists I have not separated the forms of *Dianthœcia*, partly because the character was not easy to verify, or I had only males, while the pupa, which presents some peculiarities as studied in Europe, is quite unknown. Peculiar American Hadenoid genera, with hairy eyes, seem to be *Nephelodes*, *Admetovis*, *Tricholita*, *Trichoclea*, *Trichopolia* and *Eupsephopœctes*.

I would here draw attention to the fact, that the generic characters in the *Noctuidæ* and the moths generally are of such a nature that a difference of opinion may legitimately arise. Undoubtedly, an ultimate and better opinion may be obtained, but criticism is to be only indulged in with that moderation which the nature of the subject demands. Far different is it with matters concerning positive or actual structure, where the empiric has before him a certain specimen under the microscope. In such cases, as with the genus *Cerathosia*, where the describer erroneously describes the neuration or other actual features, a positive error is committed and the author earns that measure of opprobrium which belongs to defective work in Natural History.

The European Hadenoid genera, with naked and lashed eyes, *Episema*. *Thecophora* and *Dichonia* seem to be absent from our fauna. *Polia*, which has the antennæ tufted at base and usually pectinate or serrated in the males, has eleven European species; in the Bull. U. S. Geol. Surv, VI., 266, I have given the list of ten American forms referred here, whether they are all strictly correct, I am uncertain. The European genera, with few species, *Metopoceras*, *Cladocera*, *Heliophobus*, *Ulochlœna*, *Oxytrypia*, are yet without described American species. Guenee's *Chariptera festa* seems to be the *Cerma cora* of Hübner, and not to be congeneric with the European *viridana*. Mr. Morrison's *Valeria Grotei* has a claw on the fore tibiæ; consequently is not congeneric with the European *jaspidea*, but seems to be allied to *Dicopis*.

The genus *Oncocnemis* is a smooth, almost Agrotid form, considered by Herrich-Schaeffer as allied to *Heliothis* with a claw on the front tibiæ, represented by two Russian species, of which *confusa* has a representative form in the Californian *Behrensi*. I have described the large number of nineteen American species (three having yellow secondaries, *Hayesi*,

Dayi and *mirificalis)*, while other authors have added four; our most beautiful Eastern form being the *atrifasciata* of Mr. Morrison, which I refer to this genus, it being related apparently to the grey forms, such as *Chandleri*, *riparia*, etc., the median space filled with black. I refer two Western species to the European genus *Valeria*, *opina* and *conserta*, and one Eastern species, *stigmata*, to the European genus *Dryobota*. Peculiar American Hadenoid genera, with naked eyes, seem to be *Arthrochlora*, *Hillia*, *Homohadena*, *Pachypolia* and *Hadenella*. The typical genus, *Hadena* itself,seems to have a parallel representation in North America with the other leading genera *Apatela*, *Agrotis* and *Mamestra*, from which latter genus the species differ in having naked eyes. It offers both identical and representative species with the European forms, and again an excess in number, over sixty to over forty. The related genus *Hyppa* with its one European species has a representative American form *xylinoides*. I have identified the European *Dipterygia pinastri* as occurring in North America; whether this is a survival, or a more recent importation, is doubtful, perhaps the latter. Of the European genus *Actinotia*, we have two species; of *Callopistria*, one. A strong analogy of the two faunæ is offered by the genera clustering about *Euplexia*, the single species of which latter, *lucipara*, is found from the East to California, and is apparently an unchanged survival and identical with the European; I have found the larvæ on a number of plants, among them the common *Fuchsia*. These genera are *Trigonophora*, and *Brotolomia*, each with representative American forms, while the European genus *Habryntis* is perhaps not found in America, nor, conversely, the American genus *Conservula* in Europe. *Prodenia*, which has one European, has at least four North American species. This genus is a Southern form, intruding into the European fauna from the Mediterranean and Asia Minor; in America, more plentiful in the Southern States, where an allied form, the *Laphygma frugiperda* of Abbot and Smith, is destructive to corn. We have nothing like the wide-winged European *Mania maura*, so far as my knowledge goes. The determination of what species is the real type of the earlier genera of Ochsenheimer and other authors is a matter of some difficulty, owing to the fact that the species were loosely associated, and the characters we today consider of importance neglected. Not a single species included by Boisduval in 1829 under *Luperina* is placed under *Luperina* by Lederer. The true type of *Luperina* may, I think, be considered to be the Euro-

pean *testacea*, which Lederer includes under *Apamea* Tr. Probably the true type of *Apamea* may be found in *nictitans*, one of the original species.

Of neither *Luperina* Boisd. (= *Apamea* Led.), or *Ledereria m.* (= *Luperina* Led. non Boisd.), do I know American species. *Apamea nictitans* occurs with us however, from California to the East probably as an unchanged survival, not only in the typical, but also in the varietal European forms. Whether *nictitans* and certain allied species are distinct from *Gortyna*, I, however, doubt, and it is probable that we have but one genus which European authors call *Hydræcia* Guen. Now the type of *Hydræcia* is *micacea*, as cited in the Species Gèneral. But the type of *Gortyna* is already designated by Hübner as *micacea*, consequently *Hydræcia* must fall. For *Gortyna* Led., with its one species *flavago*, which differs from *Hydræcia* by its mucronate clypeus, the term *Ochria* must be used, as I have pointed out. The objectors to Hübner must be told that Ochsenheimer cites him as authority, himself giving no diagnoses to the Noctuid genera ; that the older Noctuid generic names are all incompletely founded, that there is no standard for exact generic definition, and finally, that Hübner has given us more information and a better classification for the *Noctuidæ* than any author before his time. Hübner separates the *Thyatirinæ* correctly for the first time ; he is the author of the leading generic divisions and names, *Apatela*, *Agrotis*, *Heliothis*, etc., names which have been wrongly credited to his successors. The North American species of *Gortyna* (including those separated by me with *nictitans)* are much more numerous than the European. The finest species is our beautiful *Gortyna speciosissima.* We have two species with mucronate clypeus ; one from the East, *buffaloensis*, and another from the West. In ornamentation these species resemble the other *Gortynæ*, but we must refer them to *Ochria*, together with the European *flavago*. Our North American species which most nearly resembles the European *flavago*, is, however, my *Cataphracta*, but here the front is smooth. The question then arises as to the value of the frontal tubercle ; whether it may not be developed as easily as modifications in the color or pattern of ornamentation. Such questions are beyond our present ability to answer. We must use what characters we find upon which to found our genera, but the difficulties which the subject presents should preclude all notion that our present opinions are infallible, or that we have any reasonable pretext to arrogate to ourselves a superiority in our classi-

fication which allows us to speak unduly and depreciatingly of those who studied these matters long ago.

As with former groups, the North American *Hadenini* show a prevailing affinity with the European fauna. The amount of divergence can hardly be shown until all the species are carefully compared, but we can be sure it will not outweigh the resemblance.

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 175.)

Sub-Family ARCTIINÆ.

In the previous paper I explained the sense in which this term is used, and nothing further in the way of definition need be said on that head.

Genus CROCOTA Hbn.

1816—*Verzeichniss;* Samml., Eur. Schm., III., 254.

This genus is in a sad state. It is almost impossible to identify species satisfactorily, and yet new species are constantly described. The matter has been further confused by Mr. Grote's persistent refusal to refer to Mr. Reakirt's species, for without referring them positively as synonyms to any species, he says he cannot believe that they refer to species different from those recognized by him, and therefore he ignores them altogether. This has had the effect of causing others to lose track of the descriptions which, poor as they may be, yet are necessary to be referred to. We know nothing at all as yet as to the range of variation in the genus, and species are based upon the most indefinite comparative features of colour and appearance.

Using *C. ferruginosa* as subject: The head is free, rather small; eyes large, somewhat prominent; ocelli distinct; vestiture scaly, smooth; antennæ of male with the joints marked, scarcely serrate, with fine lateral ciliæ, palpi moderate in length, straight or slightly drooping. Thoracic vestiture scaly. Legs closely scaled, posterior longest, the spurs normal —*i. e.*, middle with one, posterior with two pairs. The tongue is rather short, but corneous and spiral. Wings proportionately wide and short,

rather frail and thinly scaled, usually some shade of reddish or yellowish, more rarely tending to black. On the primaries, veins 7 to 10 inclusive are on a stalk out of the end of the cell, 10 thus not arising out of the subcostal, 3, 4 and 5 are almost equidistant from the end of the median. On the secondaries, 3 and 4 are from the end of the cell, 5 is wanting, 6 and 7 from a stalk out of the end of the subcostal, 8 from subcostal, about one-third from base. There may be some variation in the origin of 2, 6 and 7 of secondaries, and 5 may be present in some species; these are variable points in this family.

From what I have seen, I believe that almost any good local collection would show most of the species; in other words, I believe individual characters have been largely used for specific distinction.

C. aurantiaca Hbn.

1825—Hübner, Zutr., p. 9, ff. 411, 412, *Eubaphe.*
1855—Wlk., C. B. Mus. Lep. Het., II., 523, *Eubaphe.*
1862—Morris, Synopsis, 253, *Eubaphe.*
1864—Pack., Proc. Ent. Soc., Phil., III., 103, *Crocota.*
Habitat—" Georgia." Eastern and Middle States.

Packard apparently did not recognize this species. I am not sure that I have it correctly, but what I take to be the species seems to occur east of the Mississippi and north of the Carolinas.

C. belfragei Stretch.

1885—Stretch, Ent. Amer., I., 103, *Crocota.*
Habitat—Texas.

C. brevicornis Wlk.

1855—Wlk., C. B. Mus. Lep. Het., II., 536, *Crocota.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 542, *Crocota.*
1862—Morris, Synopsis, 255, *Crocota.*
1862—Clem. in App. to Morris' Syn., 308, *Crocota.*
1864—Pack., Proc. Ent. Soc., Phil., III., 104 *Crocota.*
1877—Butl., Tr. Ent. Soc., Lond., 367, *Eubaphe.*
Habitat—Can., Maine, N. Y., Mass., Ohio, Ills., Colo.

Apparently quite widely distributed. Butler says Walker had several specimens of this species among his *rubicundaria.*

C. costata Stretch.

1885—Str., Ent. Amer., I., 103, *Crocota.*
Habitat—Texas.

Apparently a very distinct species, which I have identified in the National Museum collection.

C. diminutiva Graef.

1887—Graef, Ent. Amer., III., 42, *Crocota.*
Habitat—Texas.

C. ferruginosa Walker.

1855—Walk.,* C. B. Mus. Lep. Het., II., 535, *Crocota.*
1860—Clem., Proc. Ac. N. Sci., Phil,, XII., 542, *Crocota.*
1862—Morris, Synopsis, 255, *Crocota.*
1862—Clem., in Morris Syn., App., 308, *Crocota.*
1864—Pack., Proc. Ent. Soc., Phil., III., 103, *Crocota.*
1867—Grt., Proc. Ent. Soc., Phil., VI., 313, *Crocota.*
1868—Bethune, CAN. ENT., I., 18, *Crocota.*
1877—Butl., Tr. Ent. Soc., Lond., 367, *Eubaphe.*
aurantiaca ‡ Harris.
1850—Harris in Ag. Lake Super., 393, *Eubaphe.*
1864—Pack., Proc. Ent. Soc., Phil., III., 103, pr. syn.
rubicundaria ‡ Walker.
1855—Wlk., C. B. Mus., Lep. Het., II., 536, *Crocota.*
1868—Grt. & Rob., Tr. Am. Ent. Soc., II., 71, pr. syn.
Habitat—Canada to N. Y., west to the Mississippi, Lake Superior, H. B. Terr., Maine.

The distribution is probably wider. It is quite uncertain what this species really is, and authors are not agreed. Butler says one specimen of Walker's *rubicundaria* is referable here.

C. fragilis Strk.

1879—Rept. Engin., 1878-79, V., p. 1859, *Crocota.*
Habitat—" Pagosa Springs," July 21.

This is almost certainly *Ameria unicolor*, if Mr. Strecker's description is good for anything.

C. immaculata Reak.

1864—Reak., Proc. Ent. Soc., Phil., II., 372, *Crocota.*
Habitat—Philadelphia, Pa.

* This sign, whenever used with a reference, as above, indicates that the early stages were referred to.

So far as I know this species has not been positively identified with any other.

C. intermedia Graef.

1887—Graef, Ent. Amer., III., 42, *Crocota.*

Habitat—Texas.

C. læta Bdv.

1829—Bdv. in Guer. Icon. Ins., pl. 88, f. 6, p. 519, *Lithosia.*

1855—Walker, C. B. Mus. Lep. Het., II., 537, *Crocota.*

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 537, *Crocota.*

1862—Clem. in App. to Morris, Syn., 309, *Crocota.*

1864—Pack., Proc. Ent. Soc, Phil., III., 105, = *brevicornis.*

1877—Butl., Tr. Ent. Soc., Lond., 367, *Eubaphe.*

treatii Grote.

1865—Grt., Proc. Ent. Soc., Phil., IV., 322.

1882—Grt., New List 15, ? = *treatii.*

Habitat—Mass., N. Y., N. J., D. C.

I have in some way mislaid my notes on the figure in Griffith's Cuvier; that in Guerin I have never seen. My recollection is that the figure is on the same plate with that of *Callimorpha Lecontei* (pl. 32), and is the lower figure on the plate. I never had any doubt of its being the species afterward called *treatii* by Mr. Grote. Dr. Packard had evidently not seen this species when he hazarded the suggestion that this might be the same as Walker's *brevicornis.*

C. nigricans Reakirt.

1864—Reak., Proc. Ent. Soc., Phil., II., 371, *Crocota.*

Habitat—Philadelphia, Pa.

Unknown to me.

C. obscura Stretch.

1885—Stretch, Ent. Amer., I., 103, *Crocota.*

Habitat—N. H., Pa.

C. opella Grote.

1863—Grt., Proc. Ent. Soc., Phil., I., 345, *Crocota.*

1863—Grt., Proc. Ent. Soc., Phil., II., 30, pl. 2, f. 1.

1867—Grt., Proc. Ent. Soc, Phil., VI., 313, *Crocota.*

1877—Butl., Tr. Ent. Soc., Lond., 367, *Eubaphe.*

Habitat—Pa., N. Y., Can.

Butler says Walker included specimens of this species with his *rubicundaria.*

C. opelloides Graef.

1887—Graef, Ent., Amer., III., 42, *Crocota.*

Habitat—Texas.

C. ostenta Hy. Edwards.

1881—Edw., Papilio, I., 12, *Crocota.*

Habitat—Arizona.

C. quinaria Grote.

1863—Grt., Proc. Ent. Soc., Phil., II., 30, pl. 2, f. 2, ♀, *Crocota.*

1864—Pack., Proc. Ent. Soc., Phil., III., 105, *Crocota.*

1867—Grt., Proc. Ent. Soc., Phil., VI., 313, *Crocota.*

choriona Reakirt.

1864—Reak., Proc. Ent. Soc., Phil, II., 371, *Crocota.*

1864—Pack., Proc. Ent. Soc., Phil., III., 105, ? pr. syn.

1865—Grt., Proc. Ent. Soc., Phil., V., 234, pr. syn.

bimaculata Saunders.

1869—Saund., CAN. ENT., II., 51, *Arctia.*

1882—Grt., New List, pr. syn.

Habitat—Mass., Can., Pa., Colo. "8,000 ft."

C. rubicundaria Hübner.

1825—Hbn., Zutr., p. 28, 256, ff. 511, 512, *Crocota.*

1855—Walk., C. B. Mus. Lep. Het., II., 536, *Crocota.*

1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 541, *Crocota.*

1862—Morris, Synopsis, 256, *Crocota.*

1862—Clem., App. to Morris Syn., 307, = *Phrag. rubicosa.*

1866—H.-Schaeff, Corr. Blatt, XX., 118, ?, = *aurantiaca.*

1867—Grt., Proc. Ent. Soc., Phil., VI., 313, *Crocota.*

1868—Bethune, CAN. ENT., I., 18, *Crocota.*

1877—Butler, Tr. Ent. Soc., Lond., 367, *Eubaphe.*

Habitat—Can., Mass., N. Y., Ga., Ills.

According to Butler, the *rubicundaria* of Walker is not Hübner's species, but seems a mixture of at least three other species.

Genus EMYDIA Boisd.

1829—Boisd., Ind., Meth.

This genus I know only in the European species, and from descrip-

tions by European authors. In appearance it is Lithosii-form, with rather narrow primaries and broad secondaries ; the vestiture is close, smooth ; vein 5 of secondaries is said to be wanting ; fore-tibia unarmed ; the spurs of middle and hind tibia normal. I do not remember the venation of primaries, and made no note as to the origin of vein 10.

E, ampla Grote.

1878—Grt., Can. Ent., X., 232, *Emydia*.
Habitat—Colorado.

Genus Utetheisa Hübner.

1816—Hübn., Verzeichniss, 168.

A well marked genus containing very handsome and extremely variable species, since it has been determined that all our forms are but varieties of one species. The head is distinct, free, eyes rather large, not prominent, ocelli distinct. The palpi are slender, ascending, reaching the middle of front, the terminal joint rather long, closely scaled. Antennæ moderately long, slender, simple in the ♀, in the ♂ the joints marked with single lateral bristles. Legs closely scaled, quite considerably longer posteriorly, all the spurs complete and moderate in length. Body closely scaled. Primaries with vein 10 out of the subcostal, a short cross vein connecting it with the stalk bearing 7, 8 and 9, and thus forming an accessory cell ; 6 is from the end of the sub-costal ; 4 and 5 are close together out of the end of the median ; 3 somewhat remote from 4, but much nearer than to 6. Secondaries with 3, 4 and 5 very close together from the end of the median ; 6 and 7 together from the end of the sub-costal ; 8 as usual about one-third from base out of the subcostal. Both *Crocota* and *Emydia* lack vein 5 of secondaries, which is a decided *Lithosiid* tendency ; *Utetheisa* has 5 well marked, and has a distinct accessory cell, the relation to *Callimorpha* being obvious in the entire scheme of venation.

As the species are attractive as well as variable, the literature is voluminous, and yet I have given none of the "popular" or economic references.

N. bella Linne.

1758—Linn., Syst. Nat. Ed., X., 534, *Tinea*.
1767—Linn., Syst. Nat. Ed., XII., 885, *Tinea*.

1764—Linn., Mus. L. U., 399, *Tinea.*
1770—Drury, Exot., I., 51, pl. XXIV., f. 3, *Tinea.*
1775—Fabr., Syst. Ent., 585, *Bombyx.*
1781—Fabr., Sp. Int., II., 203, *Bombyx.*
1787—Fabr., Mant. Ins., II., 131, *Bombyx.*
1791—Oliv., Encycl. Meth., V., 99, pl. 72, f. 10, *Bombyx.*
1793—Fabr., Ent. Syst., III,, p. 479, *Bombyx.*
1793—Gmel., Ed. Linn. Syst. Nat., 2447, *Bombyx.*
1816—Hübner, Verzeichniss, 168, *Utetheisa.*
1837—Westwood, Ed. Drury, I., 46, *Deiopeia.*
1841—Harris, Rept. Ins., Mass., *Deiopeia.*
1841—Duncan, Nat. Libr., XXXII., 191, pl. 24, f. 1, *Deiopeia.*
1855—Wlk., C. B. Mus. Lep. Het., III., 568, *Deiopeia.*
1862—Morris, Synopsis, Supplt., 251, 313, *Deiopeia.*
1862—Harris, Inj. Ins. Flint Ed., 342, pl. VI., f, 2, *Deiopeia.*
1864—Pack., Proc. Ent. Soc., Phil., III., 105, *Utetheisa.*
1865—Grt., Proc. Ent. Soc., Phil., V., 234, *Utetheisa.*
1866—H.-Schaeff, Corr. Blatt, XX., 119, *Callimorpha.*
1869—Bethune, CAN. ENT., I., 18, *Utetheisa.*
1873—Stretch*, Zyg. & Bomb., 56, 236, pl. 2, f. 15, *Utetheisa.*
1875—Saund., CAN. ENT., VII., 85, f. 1, *Deiopeia.*
1877—Butler, Trans. Ent. Soc., Lond, 361, *Deiopeia.*
1879—Hulst., Bull. Bkln. Ent. Soc., I., 83, *Deiopeia.*
1883—Edw.* Papilio, III.. 128, *Utetheisa.*
1886—Moeschl., Ent. Amer., II., 75, *Utetheisa.*
1887—Gundlach, Cont. Ent. Cuba, 257, *Utetheisa.*
var hybrida Butler (between *bella* and *ornatrix*).
1877—Butl., Trans. Ent. Soc., Lond., 361, *Deiopeia.*
var. *ornatrix* Linn.
1758—Linn., Syst. Nat. Ed., X., 511, *Noctua.*
1767—Linn., Syst. Nat. Ed., XII., 839, *Noctua.*
1764—Linn., Mus. L. U., 384, *Noctua.*
1770—Drury, Exot., I., 51, pl. 24, f. 2, *Noctua.*
1775—Fabr., Syst. Ent., 586, *Bombyx.*
1779—Cram., Pap. Exot., II., 107, 108, pl. 161, ff. C, D, F, *Phalaena.*
1781—Fabr., Sp. Ins., II., 203, *Bombyx.*
1787—Fabr., Mant. Ins., II., 131, *Bombyx.*

1791—Oliv., Enc. Meth., V., 100, *Bombyx.*
1793—Fabr., Ent. Syst., III., 1, 479, *Bombyx.*
1816—Hbn., Verzeichniss, 168, *Utetheisa.*
1820—Hbn., Samml. Ex. Schmett., II., pl. 394. *Utetheisa.*
1837—Westw., Ed. Dru., I., 46, pl. 24, f. 2, *Deiopeia.*
1855—Walker, C. B. Mus. Lep. Het., III., 567, *Deiopeia.*
1856—Lucas in Sagra's Cuba, 301, *Deiopeia.*
1865—Grt., Proc. Ent. Soc., Phil., V., 234, pr. var.
1873—Stretch, Zyg. & Bomb., 58, pl. 2, f. 18, *Utetheisa.*
1877—Butler, Trans. Ent. Soc., Lond., 361, *Deiopeia.*
1886—Moeschl., Ent. Amer., II., 75, *Utetheisa.*
var *intermedia* Butler (between *bella* and *speciosa*).
1877—Butl., Tr. Ent. Soc., Lond., 361, *Deiopeia.*
var *speciosa* Walk.
1855—Wlk., C. B. Mus. Lep. Het., III., 568, *Deiopeia.*
1862—Morris, Synopsis Supplt., 314, *Deiopeia.*
1865—Grt., Proc. Ent. Soc., Phil., V., 234, pr. var.
1868—Grt. & Rob., Tr. Am. Ent. Soc., II., 71, pr. var.
1873—Stretch, Zyg. & Bomb., 57, pl. 2, f. 16, *Utetheisa.*
1877—Butl., Tr. Ent. Soc., Lond., *Deiopeia.*
1886—Moeschl., Ent. Amer., II., 75, *Utetheisa.*
bella ‡ Cram.
1779—Cram., Pap. Ex., III., 20, pl. 109, ff. C and D, *Phalaena.*
1886—Moeschl., Ent. Amer., II., 75, = *speciosa.*
Habitat—Can. to D. C., Ga., west to Miss., Ia,, Mo., for *bella* varying to *ornatrix* in Tex., Mex., Fla., West Indies, where also *speciosa* occurs.
Recorded food plants are *Crotelaria*, *Lupin*, *Prunus*, *Lepedeza*, *Ulmus.*

Few species have greater bibliography, and, as already hinted, it is far from complete.

Mr. Butler's paper in the Trans. Ent. Soc., London, for 1877, seems to have been lost sight of. Mr. Grote does not quote his varieties in his "New List," nor does Mr. Hy. Edwards, in his additions, Ento. Amer., March, 1888, refer to them.

(To be continued.)

Mailed October 4th.

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POPULAR AND ECONOMIC ENTOMOLOGY—No. 5.

THE TIGER-SWALLOW-TAIL *(Papilio Turnus, L.)*

BY JAMES FLETCHER, OTTAWA.

Just about the time the lilac bushes open their fragrant blossoms the grand insect shown at figure 9 may be seen either hovering over gardens and sipping the nectar of flowers, or sailing majestically down some woodland glade. It generally appears at Ottawa about the first of June,

Figure 9.

and may be seen for a month or more. Farther to the north it comes later, not appearing at Nepigon, north of Lake Superior, until the end of June. This insect has many characters which make it of interest to the collector. Its size and beauty make it a striking object in the spring landscape. Although it varies in abundance in different years, it is generally one of the first treasures of the young collector, and is prized accordingly. The variations it presents in different latitudes and the habits of its remark-

able caterpillar are of great interest to the student. In the north, including the whole of Canada, the males and females are like our figure, having the ground colour of a pale lemon yellow, with rich black markings. The broad margin is more or less powdered with blue scales, particularly on the hind wings, which are further ornamented with a conspicuous orange-red spot, bordered with black and blue, near the hind angle, and in the females there is another large spot of the same colour at the upper angle. In the Southern States the specimens of both sexes are larger and more highly coloured, and besides a black dimorphic form of the female also occurs. No specimen of a black male has ever been taken. The only approach to this melanic form is the beautiful suffused variety which is figured below. The range of the Tiger-Swallow-tail is very extended. I have some specimens from the arctic circle and others from the tropics, while from east to west it occurs from Newfoundland to Alaska. The eggs are laid by the females singly on the upper side of the leaves of its food plants. They are about one-twentieth of an inch in diameter, sub-globular and smooth, at first of a pale transparent green, much yellower at the base by reason of a more or less abundant waxy substance which fastened them to the leaf; after a few days they turn reddish, and just before the young larvæ hatch they are almost black. The time of hatching varies with the weather from ten to twenty days. The caterpillars are very different in appearance during their various stages. In the first stage the general appearance is black, with white spots and tubercles, and a conspicuous white saddle-shaped mark on the back. This mark also appears after the first and second moults, but is then of a pinkish cream colour. After the second moult the ground colour of the body usually changes to greenish brown. After the third moult the green colour is much more decided, and the caterpillar assumes more of the shape and markings of the full-fed larva. The thoracic segments are now enlarged and the saddle-shaped mark is almost obliterated. There is a yellowish band in front of segment 2, and another on the hinder edges of segments 5 and 12; that on 5 is followed closely by a black line on the front edge of segment 6. This black line does not show when the caterpillar is at rest. The head is pink brown. On each side of segment 4 now appears a pear-shaped yellow eye-like spot, the larger end outwards. This spot is edged by a fine black line; inside there is a heavy black line enclosing a violet spot.

Towards the smaller end of this yellow spot is a short black bar. The sides of the body are also ornamented with rows of violet spots, two upon segment 4, and four upon 5, 8, 9, 10 and 11, and two upon 12. On segments 6 to 11 there is one small spot below each spiracle. These spots are more distinct upon some specimens than upon others.

After the fourth or last moult the colour is invariably velvety green, paler beneath, the saddle-shaped mark has disappeared and the yellow marks are all more conspicuous. The full-grown caterpillar is shown at figure 10, and is a formidable looking creature. For two days before it suspends itself to change to the chrysalis, it gradually assumes a purplish brown tint, and the violet spots become more distinct than they were before. The full-grown larva is about one inch and a-half in length when walking. When at rest it is shorter and thicker, the head is drawn in out of sight and the body assumes a wedge shape, large in front, tapering rapidly to the last segment. When in this position the yellow spots on segment 4 have the appearance of two large open eyes. This appearance may possibly act as a protection from some of its enemies. When ready to turn to a chrysalis, it leaves its food-plant and seeks some place to pupate. It suspends itself to a silken mat and supports its body by means of a silken girdle around the middle. It changes to a chrysalis the second day after suspension. The newly formed chrysalis is very beautiful, being mottled with green, dove colour, black, and white, the two eye-like spots on segment 4 being very distinct. After a few hours, however, the green nearly all fades out and the chrysalis darkens to the tint of dead wood. In all parts of Canada there is only one brood of this butterfly. The eggs are laid in June and July and the caterpillars pupate late in the summer and go through the winter in the chrysalis state. The habits of the caterpillar are sluggish. From the first they spin a mat of silk to rest upon when not eating and sally out to feed. When very young they eat into the edge of the leaf upon which they hatch ; but as they grow larger they crawl away to other leaves near at hand, and return again to rest upon the same leaf, all the time there is food at a convenient distance ; when this is all consumed they move off to a fresh

Figure 10.

branch and start another centre of operations. This mat is so spun as to curl the leaf up somewhat and form a platform, so that in case of rain the caterpillar is raised above the wet leaf. When disturbed they have a special means of defence, in the shape of an orange forked scent-organ, which they can protude at will from an orifice in the second segment. At the same time a strong pungent odour is emitted. The caterpillars possess this organ in all their stages, but seldom use it except in the last stage. The food-plant of this insect is very varied. In this district it is most frequently found upon apple, cherry, ash, birch and aspen trees.

Figure 11 represents a very beautiful suffused melanic male, which

Figure 11.

was taken in July, 1888, by Mr. Robert Mackenzie, at Collins Inlet, upon the Georgian Bay, eighteen miles east of Killarney, Ont. As this is the only approach to a black male which has so far been discovered, it has been thought well to have it photographed and engraved. The specimen is in very fine condition, the black and yellow clear and unfaded. The red eye-spot at the anal angle is distinct, and there is another between the extremities of the second and third median veinlets of the hind wing. A few scales of blue shadow the spot at anal angle. There is a conspicuous cloud of the same colour between the second and third median veinlets and a smaller one between the first and second. At the apex of hind wing there is a light cloud of red scales, and a slight tinge of red between the extremities of costal and first subcostal veins.

THE CLASSIFICATION OF OUR BUTTERFLIES.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

At different times, in making notes for a general list of our Lepidoptera, I have taken up the arrangement of our butterflies, and, although such a list must now be undertaken by some one else, I think it worth while to set down the conclusions to which I had come.

For myself, I have preferred to consider all the true butterflies as more nearly related to each other than to the *Hesperidæ* and *Paleohesperidæ*. In other words, the latter seem the equivalent, structurally speaking, of the other butterflies. The characters by which modern "families" are recognized are unequal, and perhaps these groups are really of no more than sub-family value. But, granting these groups to be as they are now held, families, the sequence, with the *Papilionidæ* at the head, seems less reasonable than that which commences with the *Nymphalidæ*, or the so-called "four-footed" butterflies. And this on general grounds. For it is a clear departure from the usually six-footed type, that the anterior pair should be shortened and rendered more or less useless for walking purposes. It is probably not to be assumed that the families evolved from each other, but evolution was simultaneous and unequal. The character of the shortening of the fore-feet appears in a less degree in other families of butterflies, and probably exists as a tendency latent in the whole group. The fore-feet become gradually disused in walking, and this disuse is followed by a modification of structure. We are tied to a linear series in our catalogues and classifications, and the real descent and sequence in time of our butterflies can never be made out and never displayed in our artificial arrangements. We are conditioned by our own physical structure. Our appreciation of what surrounds us is limited by the imperfection of our senses. We cannot *see* evolution, and the actual progression of growth escapes us. Only by reasoning do we recognize the doctrine of descent. It is easier for us to construct a genealogical tree than to prove its correctness beyond reasonable doubt.

Undoubtedly such drawings assist our comprehension of the possible *modus operandi*, but the artist must be exceedingly well up before he thus gives the reins to his imagination. In the best case they are not facts, and must not be accepted as such; they are, it may be, ladders for the mind, which we may climb if we will, to find at the top perhaps as imaginary

a result as Jack attained from his bean-stalk. To draw such a tree may be pardonable, but to believe in it afterwards, as representing real succession, is an infirmity of the scholar's mind. Who can tell the real succession in time and place? There may be assumed a certain progression in the development of form, but beyond this there is nothing to justify our pretence that we are classifying our Lepidoptera according to real descent. Nature or natural selection deals with individuals; if the type persists, it is represented by species.

It may be that certain species of tropical *Papilio* are more recent evolutions, newer species, than many *Nymphalidæ;* but the four-footed butterfly must have come, one would think, from a six-footed ancestor. Hence, in a linear series, we may commence reasonably with the *Nymphalidæ.* Again, the habits of the larvæ of these latter are very complex, and seem to have been slowly modified and acquired. Mr. Edwards has told us much about them. The larvæ themselves are most curious objects, leaving the usual range of larval forms. In certain genera from South America are curious horns attached to the head, reaching backwards and reminding us of the flower spurs of *Aquilegia.* The larvæ of the *Papilionidæ*, as I have elsewhere said, are not without resemblances to the Hawk moths. As to pupation, it may be assumed that cocoon-making, or spinning, is older than its disuse. Almost all the "higher" groups, that is, groups which may have issued from a former complex, show some modification of this habit in the direction of its disuse. Thus the Hawk moths, which may have come from a common ancestry with the *Ceratocampinæ*, probably first passing through a type analogous to existing *Smerinthinæ*, have very generally discarded cocoon-making. In discussing all these matters, we must be careful not to put the cart before the horse, as the Chippeways did, who held the pretty notion that the butterfly made the south wind, and not the south wind the butterfly.

The *Papilionidæ*, in the consistency and form of the body, in its hairiness, in the dark and bright contrasting colors, in the tailing and structure of the secondaries, show certain approximations to the *Hesperidæ*, so that our placing them at the end of the true butterflies does not do violence to their structure. And as they are six-legged butterflies, we should naturally finish with them. The departure, which probably exists as a tendency in the group, is here not expressed, and they are like the *Hesperidæ* in this respect. But we must not look upon the *Papilionidæ*

as a connecting link *(Uebergang)* to the *Hesperidæ*. They are, in most respects, as far from the skippers as any other true butterfly. The coincidences at best indicate that, in certain characters, the *Papilionidæ* stand nearer to the common ancestor than the *Nymphalidæ*. But whether our surmises are right or wrong—and that they are right or wrong cannot be proved, and is a matter of mere reasonable probability—we stand in need of a linear series for our catalogues and collections. This is a practical want, and we must meet it by the most philosophical means possible. We are offered a certain character in the true butterflies, the different modifications of the front pair of feet, and this character it is clearly philosophic and practical to use. We must not be influenced by slighter characters to overturn our conclusions, or by vague general considerations which are wide of the result we are aiming at, which is a *reasonable* sequence for our species, genera and families of butterflies.

I find that Mr. Wallace says that the *Danaidæ*, no less than the *Papilionidæ*, have developed complicated adaptations to the surrounding organic and inorganic universe. Adaptation, mimicry and dimorphism, depend evidently on climate and surroundings, and are not any proof of higher structural value in themselves. They are phenomena called forth by circumstance, with the plastic butterfly as the wax for the seal. Perhaps this very plasticity is a proof of a certain weakness of type, just as weakness of character in us is displayed by our attending to every wind that blows. "In the extensive family of *Nymphalidæ*," says Mr. Wallace, "we find that several of the larger species, of feebler structure, have their wings modified; while the powerful species, which have all an excessively rapid flight, have exactly the same form of wing in Celebes as in the other islands." Size or relative beauty are no guide for a structural arrangement.

I should commence, then, the linear series of our butterflies with the four-footed butterflies: First the *Nymphalidæ*, following these with the *Satyridæ*, which differ by the blistering of the veins of the fore-wings, and are considered by writers generally as a distinct "family." There have to be general considerations guiding our arrangement of the genera; and the knowledge requisite to form these is hardly gathered yet. A mere technical description of form and structure is not of itself sufficient. Comparisons are needed of all the stages. Again, in the stringing together of the mass of detail, the general principles which should guide us in estab-

ishing the higher divisions are lost sight of. The *Satyridæ* are evidently "lower" than the *Nymphalidæ*, perhaps retaining in habits and markings traces of a former physical condition of the globe. I have written briefly, originally, on the habits and conditions of *Oeneis semidea*, and I regard this genus as a low, perhaps the lowest type of Satyrid. We now come to a series of "families" of butterflies in which the shortening of the fore-feet is confined to the male sex. These are the *Libytheidæ*, as I have thought, a very old form of butterfly (Can. Ent. XVIII., 163), the *Erycinidæ*, to which I would refer my genus *Feniseca*, and the *Lycæindæ*, in which the male fore tibiæ end in a hooklet. We now come to the six-footed butterflies, which we may divide into three "families," the *Pieridæ*, the *Parnassidæ* and the *Papilionidæ*. The *Hesperidæ*, which differ by the proportions of the body and position of the wings, fall into two groups, as the fore tibiæ are with or without epiphysis, and may then follow. The series of butterflies may be closed by my *Paleohesperidæ*, with spinose tibiæ,—moth-like butterflies preparing us for the *Castniadæ*, and apparently relics of a stage between moth and butterfly surviving in the North American fauna.

There is, I think, nothing to be gained by cataloguing our Lepidoptera upside down, as seems to be proposed by Packard, commencing with the supposed "lowest" moths. Theoretically we may conceive that the moths are "lower" than the butterflies, and that in some unknown way the latter have come from moth-like ancestors. Palæontological proof is now wanting, but there is some circumstantial evidence to be gathered that such has been the case. If there has been evolution, then butterfly-like forms cannot have produced moths, but the reverse. At a later epoch in the history of creation than the origin of butterflies, changes of climate have evidently taken place. The winter now finds the butterflies in all stages. The lethargy of the half-grown caterpillar seems to have survived from a time when the winters were longer, came more suddenly, than at present. It was no longer time for the butterfly to grow, or the food plant formerly then perished. Now there is time and food, but the butterfly will not yet believe it, needing the evidence of centuries, and prepares to winter. In the moths I only have observed that certain species remain as caterpillars within the cocoon until spring.

For practical purposes, as well as for the work of comparing the faunæ of North America and Europe, and arriving at some conclusions as

to geographical distribution and origin of the different forms, in which I am much interested, we may arrange the butterflies as here suggested. But whether we assume eight "families" of the true butterflies, or only four, or only one, the sequence and the principle remain unaltered. The characters by which modern "families" are defined, chiefly by German authors *und solche die es werden wollen*, are of unequal morphological value, therefore unnatural and, it seems to me, unphilosophical.

NOTE ON THE LARVA OF THYATIRA PUDENS, Guen.

BY HARRISON G. DYAR, RHINEBECK, N. Y.

As far as I am aware no description of the larva of this insect has been published, and hence I present the following:—

T. pudens.—Mature larva. Head white, with four black spots, two covering the eyes and the others near the summit of the head. A few short, whitish hairs. Body semitransparent, whitish, flecked with opaque white spots on the dorsum and more thinly on the venter. Stigmatal space covered by a blackish shading, more distinct anteriorly; a darker dorsal line. Spiracles pale brown. Cervical spot whitish, concolorous with body. A few short pale hairs.

The larvæ feed singly on dogwood *(Cornus florida)*, each forming a place of concealment by spinning one or more leaves together by the edges. They mature by the middle of June and pupate in a slight cocoon on the ground, the winter being passed in the pupa state. The pupa has its greatest diameter through the wing cases, the abdominal segments tapering. It is dark brown, approaching black, the brown color showing more distinctly between the segments. Body punctured. Thorax, wing and leg cases finely wrinkled. Cremaster, thick, 1 mm. long, furnished with stiff, spiny hooks.

This larva well deserves its name of *pudens*, on account of its modest habits, remaining concealed in its leafy house, and appearing much disturbed if exposed. Its actions recall those of the larva of *Endamus tityrus*.

The insect has only one brood annually.

Larvæ from Duchess County, N. Y.

PREPARATORY STAGES OF LEPTARCTIA CALIFORNIÆ WALKER, WITH NOTES ON THE GENUS.

BY G. H. FRENCH, CARBONDALE, ILL.

EGG.—Diameter .03 inch. Globular, smooth. Color whitish, with a pearly lustre. Duration of this period here four days, in the mountains of California six days.

YOUNG LARVA.—Length .07 inch. Cylindrical, six rows of tubercles from which spring hairs as long as the body. Color pale gray, head black, hairs gray. Duration of this period four days.

After 1st Moult.—Length .15 inch. Cylindrical, eight rows of tubercles, from which spring tufts of hair. Color dull pale horn yellow, a whitish dorsal line; tubercles black, the hairs gray; head with the top and sides black, clypeus whitish; legs whitish. Before the close of the preceding stage the body was slightly reddish purple. Duration of this period three days.

After 2nd Moult.—Length .25 inch.—Head slightly bilobed; color smoky greenish black; tubercles black, the hairs gray; a dorsal creamy, slightly orange tinted line, and a line of lateral spots of the same color situated between the second and third rows of tubercles, counting from the dorsal line; head pale horn yellow, the upper part black, a small black spot on each side, and a small smoky spot in the centre of the front; feet concolorous with the body. Duration of this period seven days.

After 3rd Moult.—Length .50 inch; shape as before. Color smoky gray, rather dark; dorsal stripe orange, an orange spot each side of the second tubercle on each joint, counting from the dorsal line; tubercles black, each supporting a cluster of spreading brown hairs, those on joints 6 to 11 mostly about the length of the diameter of the body, those on the other joints containing a few that are much longer, the anterior and a few on joint 12 yellow, a long pencil of brown hairs on 13; head dark amber, two blackish patches in front. Duration of this period six days.

After 4th Moult.—Length .60 inch. Color gray, made so by a fine mottling of black and sordid white; the cluster of hairs from each tubercle thick and spreading, the central hairs black, the outer hairs of the cluster gray; the dorsal line, lateral spots and head unchanged.

MATURE LARVA.—Length .70 inch. There was scarcely any change

after the first of this period, As before, the body is cylindrical, with eight rows of tubercles, supporting tufts of spreading hairs, the most of these black with a few gray hairs round the outside of each cluster; the length of the hairs on the middle of body about the diameter of the body, those on the posterior part of the body about twice as long, the pencil from joint 13 about four times as long as those on the back of the middle joints; tubercles still black; head amber, with a prominent blackish spot in the centre of the anterior part of each cheek. Duration of this period 57 days.

CHRYSALIS.—Length .45 inch; length of wing and tongue cases .25 inch, extending almost to posterior part of joint 5; depth of joint 1 .14 inch; of joint 2 .15 inch; of joint 3 .16 inch; from this it tapers slightly to joint 7, from this more abruptly to the end; no hooks at anal extremity; cylindrical, anterior end rounded, the head sloping to the antennæ cases at a little less than 90 degrees; wing and antennæ cases slightly roughened, abdomen slightly punctured. Color, chestnut brown, antennæ cases and outer edges of wing cases a little paler. Duration of this period from 205 to 234 days.

There is but one brood in a season, and unlike most of our insects, it has two periods of what might be called suspended activity. One of these, the pupal period, is common to all insects undergoing complete transformations; the other, just before pupation, an unusual one, unless with a species that hibernates in the larval state. By looking over the different periods, we find them as follows:—

Egg	period....	6	days.
1st larval	"	4	"
2nd "	"	3	"
3rd "	"	7	"
4th "	"	6	"
5th "	" ..	57	"

After the fourth moult the larvæ grew to their full size in a few days, and then remained in a quiescent state, unless disturbed, during the remainder of the period. They passed the last moult July 25th, but did not pupate till September 20th. I could not see that they ate anything during this time of about 50 days, the period of our dry, hot weather, though fresh food was furnished them every day. At first I thought this

might be due to their translation from their home in the Sierras to our warmer climate, and that succeeding broods would behave differently; but the second brood raised followed the same course as their ancestors.

When preparing to pupate, they constructed loose cocoons of gray silk mingled with hairs from their own bodies, either in folded leaves or next to the dirt in the corners of their breeding box. In this they resemble our Arctians generally.

The eggs from which the larvæ furnishing these notes were obtained were sent me by my friend, Hon. C. F. McGlashan, of Truckee, California. They were received by me July 5, 1885, just hatched, after having been on the road six days. Those I bred the next year hatched in four days. The food plant given me was Pentstemon, but I fed them on *Ribes Aureum*, or Missouri Currant, which they ate readily; and I am of the opinion, that like other Arctians, they are rather general feeders.

The only species, besides this, that has a period of summer hibernation in the Bombycidæ, so far as I have noticed, is the larva of *Arachnis Picta*, Pack., described by Mr. Stretch in his Illustrations of Zygaenidæ and Bombycidæ, page 84. This larva was found May 8th and did not pupate till the middle of August, making at least 98 days without food. The *Leptarctia* larvæ remained quiet under the food given them on the earth of the breeding box, unless disturbed, when they would run rapidly, like the species of *Arctia*. I believe Mr. Stretch says the Arachnis larvæ emitted a fluid just previous to pupation, similar to that emitted by a moth when coming out of chrysalis. I did not notice whether these did the same or not.

The genus Leptarctia was founded by Mr. R. H. Stretch in his book, already referred to, in the time of its publication from 1871 to 1873. At the time of writing the description of the genus he does not seem to have known of Walker's description of *Californiæ*, as he says nothing about it till the close of the work in an addenda. He gives three species, *Lena* and *Decia* by Boisduval, and *Dimidiata* named by himself. Walker described *Californiæ* in 1855 in British Mus. Cat. Lep. Het. Vol. 3, placing it in the genus *Nemeophila*. In 1868 Boisduval described the same form as *Adnata*, together with the two already mentioned, *Lena* and *Decia*, placing them in the genus *Lithosia*, but stating that in his opinion they did not belong in that genus, but in one near *Nemeophila*. Dr.

Packard, in his "Synopsis of the Bombycidæ of the United States, 1864", does not mention any of the forms of *Leptarctia*, hence we may presume that he had not seen any of them. In the note already referred to, at the close of the volume, Stretch restores *Californiæ*, and gives *Lena* as a synonym. Grote, in his "New Check List of North American Moths, 1882", gives three names as species, *Decia*, *Lena* and *Dimidiata*, giving *Californiæ* as a synonym of *Lena*. The Brooklyn List, 1881, gives the same three names without *Californiæ*.

This is, as far as I have observed, a synopsis of the history of the forms that have been placed under the genus *Leptarctia* as species. Stretch figured several forms, but grouped them as varieties under the three species he gave. While, for lack of a large series, or the knowledge that could come from breeding, these writers have treated of these forms as species, yet there has been something of a feeling among Lepidopterists for several years that there was really only one species, and all the different forms but varieties, and that such would ultimately be proven.

(To be continued.)

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 200.)

As the descriptions are short and so generally unknown, I will reproduce them here:—

"Var. *hybrida*: Primaries of *D. bella*, but the yellow belts indistinct, secondaries of typical *D. ornatrix*, but with the ground colour red as in *D. bella*, and with a white edged, interrupted black belt across the discoidal cell.

"Hab.—United States.

"Var. *intermedia*: Primaries with the yellow belts very pale, so that the white borders of the black spots show faintly; secondaries exactly like *speciosa*.

"Hab.—United States."

Genus CALLIMORPHA Latr.

This genus has been so thoroughly discussed by Mr. Lyman and myself in CAN. ENT., XIX, 181-191 and 235-239, that it is scarcely necessary to say anything more here.

The synonymy to the date of my monographic revision in the Proc. U. S. Natl. Mus., 1887, pp. 338-353, is there given with the complete bibliography. Nothing worthy of record has been published since that time, and I therefore add a list of the species for completeness only. As this genus has been monographically treated, I adopt my own order of species :—

C. clymene Brown.
  interruptomarginata DeB.
  comma Wlk.
C. colona Hbn.
  clymene || Esp.
  carolina Harr.
C. lactata Smith.
  ♂ *conscita* Wlk., in part.
C. lecontei Bdv.
  var. *militaris* Harr.
  confinis Wlk.
C. contigua Wlk.
  reversa Stretch, in part.
C. suffusa Smith.
  lecontei ‡ Stretch et auct.
  reversa Stretch, in part.
C. confusa Lyman.
  lecontei ‡ Smith et auct.
  reversa Stretch, in part.
C. fulvicosta Clem.
  ♂ *conscita* Wlk., var. *b*.
C. vestalis Pack.
  ♀ *conscita* Wlk.

Genus EPICALLIA Hbn.

1816—Hübner, Verzeichniss, 182.

Head small, retracted; palpi short; tongue short and weak, about half the length of thorax; ocelli small; antennæ short, simple in the ♂. Legs rather well developed, the middle and hind tibiæ fully spurred; spurs small, those of posterior tibia close together. Claws of tarsi simple.

Primaries with but 11 veins, 8 being wanting; 2, 3 and 4 are from a short stalk out of the end of the median; 5 from the cross vein rather close to the stalk, 6 and the stalk bearing 7, 9 and 10 from the end of the subcostal; 10 therefore *not* from the subcostal. Secondaries with 3, 4 and 5 close together from the end of the median; 6 and 7 together from the end of the subcostal; 8 as usual from the subcostal.

The above description is based upon *E. virginalis*. Mr. Butler thinks the American entomologists have mistaken the type of *Epicallia*.

He says, Ann. Mag., N. H., 1881, ser. 5, v. VIII., p. 310:—"Why Dr. Packard and others have placed this species in *Epicallia*, of which *E. villica* is type, it would indeed be hard to say. Setting aside other differences, the utter dissimilarity of the male antennæ should have been sufficient to keep them widely separated. The pattern and colour of the wings, the less woolly and smaller thorax, and the barred abdomen are all characteristic of *Hypercompa;* in fact, with the exception of the rather shorter costal margin of primaries, which may, perhaps, be regarded as a generic character, I can see nothing to distinguish it from that genus." Mr. Butler claims *dominula* and allies as *Hypercompa (Callimorpha* Stgr.), and says our species of *Hypercompa (Callimorpha)* differ generically from the European species, and should be referred to *Haploa* Hüb. *Villica*, according to Butler the type of *Epicallia*, is placed in *Arctia* by Staudinger.

Without expressing any opinion on the subject, I refer the matter to some one having the material for study.

E. virginalis Bdv.

1852—Bdv., Lep. Calif. (Ann. Soc. Ent. Fr.), 49, *Chelonia.*
1855—Wlk., C. B. Mus. Lep. Het., III., 611, *Arctia.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 529, *Arctia.*
1862—Clem., App. to Morris Syn., 337, *Arctia.*
1864—Pack., Proc. Ent. Soc., Phil., III., 108, *Epicallia.*
1867—Grt. & Rob., Tr. Am. Ent. Soc., I., 333, pl. 6, f. 42, ♂, *Epicallia.*
1873—Stretch,* Zyg. & Bomb., 70, 238, pl. 3, ff. 2, 3, 4, and pl. 10, f. 1 (larva) *Epicallia.*
1874—Pack.,* Rept. Geol. Surv., 1874, p. 559, *Epicallia.*
1875—Edw.,* Proc. Cal. Ac. Sci., V., 186, *Epicallia,*
1876—Stretch, Rept. Surv. West. 100 Mer., V., 802, *Epicallia.*
1881—Butler, Ann. Mag., N. H., Ser. 5, VIII., 310, *Hypercompa.* var. *ochracea* Butler.
1881—Butl., Ann. Mag., N. H., Ser. 5, VIII., 310, *Hypercompa* Cites Stretch, Zyg. & Bomb., p. 71, pl. 3, f. 2, as type. var. *guttata* Bdv.
1852—Bdv., Lep. Cal. (Ann. Soc. Ent. Fr.), 48, *Agarista.*
1853—H.-Sch., Lep. Exot., 72, f. 464, *Pleretes.*
1862—Morris, Synopsis, 132, *Alypia.*

1864—Pack., Proc. Ent. Soc., Phil., III., 109, pr. var.
1867—G. & R., Trans. Am. Ent. Soc., I., 334, an sp. dist.
1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg. XII), 74, *Callimorpha.*
1873—Stretch, Zyg. & Bomb., 70, pr. var.
1875—Edw., Proc. Cal. Ac. Sci., V., 186, pr. var.
Habitat—Vanc., Calif., Or., Colo., Ariz.

Genus PLATARCTIA Packard.

1864—Pack., Proc. Ent. Soc., Phil., III., 109.

I have no notes of this genus, never having had a specimen that belonged to me absolutely.

P. borealis Moeschler.

1860—Moeschl., Wien. Ent. Monatsch., IV., 360, pl. 9, f. 3, *Arctia.*
1864—Grt., Proc. Ent. Soc., Phil., III., 74, =*parthenos.*
1864—Pack., Proc. Ent. Soc., Phil., III., 111, *Platarctia.*
1867—Pack., Proc. Bost. Soc., N. H., XI., 35, *Platarctia.*
1869—Beth., CAN. ENT., I., 45, *Platarctia.*
1873—Strk., Lep. Rhop. et. Het, 24, =*parthenos.*
1882—Grt., New List, 15, *Platarctia.*
Habitat—Can., Labr.

Mr. Grote lists this as a distinct species without comment, and I follow his lead. It is the opinion of those with both species, I believe, that *parthenos* and *borealis* refer to varieties of the same form.

P. hyperborea Curtis.

1831—Curt., App. to Ross. Narr., 2nd Voy., LXXI., p. 17, *Eyprepia.*
1855—Wlk., C. B. Mus. Lep. Het., III., 611, *Arctia.*
1857—Wlk., C. B. Mus. Lep. Het., VII., 1692, *Arctia.*
1860—Clem, Proc. Ac. N. Sci., Phil., XII., 529, *Arctia.*
1862—Morris, Synopsis, Supplt., 340, *Arctia.*
1868—Grt. & Rob. Tr. Am. Ent. Soc., II., 71, *Platarctia.*
Habitat—Arctic America.

P. parthenos Harris.

1850—Harr. in Ag. Lake Sup., 390, pl. VII., f. 4, *Arctia.*
1855—Wlk., C. B. Mus. Lep. Het., III., 608, *Arctia.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 529, *Arctia.*
1862—Morris, Synopsis, Supplt., 337, *Arctia.*

1863—Saund., Syn. Can. Arct., 4, *Arctia.*
1864—Pack., Proc. Ent. Soc., Phil., III., 110, *Platarctia.*
1868—Saund.,* Can. Ent., I., 5, *Platarctia.*
1869—Bethune, Can. Ent., I., 45, *Platarctia.*
1871—Saund.,* Can. Ent., III., 225, *Platarctia.*
1872—Lint.,* Ento. Contr., II., 132, *Platarctia.*
americana ‡ Wlk.
1855—Wlk., C. B. Mus. Lep. Het., III., 607, *Arctia.*
1868—Grt. & Rob., Tr. Am. Ent. Soc., II., 71, pr. syn.
Habitat—Can., Lake Sup., White Mts., Vt., N. Y.

P. yarrowi Stretch.

1873—Str., Zyg. and Bomb., 221, pl. IX., f. 7, ♂, *Arctia.*
1876—Str., Rept. Geog. Surv. West, 100 Mer., V., 800, pl. 40, ff. 1 and 2, *Arctia.*
1882—Grt., New List, 15, *Platarctia.*
1883—Moeschl., Stett. Ent. Zeit., 44, 116, *Arctia.*
Habitat—Labr., Arizona.

Genus Euprepia Ochs.

1810—Ochs., Schmett., III., 298.

Von Heineman's characterization gives for this genus:—Antennæ ♂ and ♀ ciliated, joints with two stouter bristles; anterior tibia with claw at tip. Primaries with accessory cell present. Based upon an examination of *E. caja*, the reference of that species to this genus is an error, since *caja* has the male antennæ pectinated, the fore tibia with but a small spine at tip, primaries without accessory cell. In *caja* the tongue is obsolete, palpi short, head retracted. All the tibiæ shorter than femora; spurs normal, but minute. Claws simple. Primaries with 3, 4 and 5 nearly equidistant from the cross vein or end of median; 6 from cross vein, very little below end of subcostal; 7, 8 and 9 on a long stalk out of end of subcostal; 10 from subcostal before the end of the cell; secondaries with 3, 4 and 5 nearly equidistant from end of median; 6 and 7 together from end of subcostal.

Pudica is said to be the type of the genus!

E. caja Linn.

1758—Linn., Syst. Nat. Ed., X., 500, *Bombyx.*
1767—Linn., Syst. Nat. Ed., XII., 819, *Bombyx.*

1781—Fabr., Sp. Ins., II., 198, *Bombyx*.
1787—Fabr., Mant. Ins., II., 128, *Bombyx*.
1816—Hübn., Verzeichniss, 181, *Zoote*.
1852—Bdv., Lep. Cal. (Ann. Soc. Fr.), 49, *Arctia*.
1855—Wlk., C. B. Mus. Lep. Het., III., 601, *Arctia*.
1860—Moeschl., Wien. Ent. Monatschr., IV., 360, *Arctia*.
1864—Grt., Pr. Ent. Soc., Phil., III., 74, an. sp. Amer. (?).
1867—Pack.,* Proc. Bost. Soc., N. H., XI., 33, *Euprepia*.
americana Harris.
1841—Harris, Rept. Ins., Mass., 246, *Arctia*.
1850—Harris in Ag., Lake Sup., 391, pl. 7, f. 5, *Arctia*.
1855—Wlk., C. B. M., Lep. Het., III., 607, *Arctia*.
1860—Clem., Proc. Ac. N. Sci., Phil. XII., 529, *Arctia*.
1862—Clem., App. to Morris Syn., 336, *Arctia*.
1863—Saund.,* Proc. Ent. Soc., Phil. II., 28, *Arctia*.
1863—Saund., Syn. Can. Arct., 3, *Arctia*.
1864—Pack., Proc. Ent. Soc., Phil., III., 114, *Euprepia*.
1869—Grt., Tr. Am. Ent. Soc., III., 537, an sp. dist., *caja*.
1872—Lintner,* Ent. Cont., II., 134, *Euprepia*.
1873—Stretch, Zyg. & Bomb. 95, pl. 4, f. 4, ♀, ib., p. 239 (larva) =*caja*.
1873—Strecker, Lep. Rhop. et. Het., 24, *caja*.
1875—Edw., Proc. Cal. Soc. Sci., V., 187, *Euprepia*.
1875—Bunker,* CAN. ENT., VII., 149, *Arctia* (life list).
1876—Lyman,* CAN. ENT., VIII., 20, *Arctia*.
1878—Strk., Proc. Dav. Ac. Sci., II., 273, pr. syn.
1882—Grt., New List, 15, =*caja*.
var. *utahensis* Edw.
1886—Edw., Ent. Amer., II., 166, *Euprepia*.
Habitat—Northern U. S., N. Y., Can., Labr., Alaska, Vanc., Calif., Utah.

I have made no attempt to give the bibliography of the European species. It would have made the references too voluminous, and the European literature is rather easily kept track of.

E. opulenta Hy. Edw.
1881—Edw., Papilio, I., 30, *Euprepia*.
Habitat—Yukon River, Alaska.

Genus CALLARCTIA Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 114.

This genus is unknown to me in nature, unless Mr. Stretch's reference, hereinafter cited, is correct. In that case it needs no special characterization.

C. ornata Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 115, *Callarctia.*
1882—Stretch, Papilio, II., 147, =*Arctia achaia ?*
Habitat—San Mateo, Calif.

Mr. Stretch's note, giving the above synonymical reference, seems to have been carefully made, and the description shows nothing to the contrary. The reference bears all the more weight since Mr. Stretch is not a lumper, and has shown in the past great deference to Dr. Packard's *dicta* in this family. Grote & Robinson's species must, therefore, drop as a synonym, while Dr. Packard's genus must fall. I leave the positive reference to others.

THE ASSOCIATION OF OFFICIAL ECONOMIC ENTOMOLOGISTS

will hold its first annual meeting in the City of Washington, D. C., on November 12th, 1889, at 11 o'clock, a. m., in the Entomological rooms at the U. S. National Museum.

According to the resolution of the Association at the Toronto meeting, the annual meeting was to be held on the date and at the place where the Association of Agricultural Colleges and Experiment Stations should next meet. The date and place for the latter meeting having been fixed, the above notice is hereby given to all members of the Association of Economic Entomologists. All titles of communications to be read should be sent to the Secretary as soon as possible, and those desiring enrolment as members will also please communicate with the Secretary.

JOHN B. SMITH, Rutger's College, New Brunswick, N. J.

CORRESPONDENCE.

THE FARMER'S OWN INSECTICIDE.

Dear Sir : Take plants of Pokeweed, *(Phytolacca decandra)*, roots, stems and leaves ; cut them into manageable lengths ; make a decoction —a sap-kettle will be useful for the purpose. Let the liquor cool, and then apply with a sprinkler. This will exterminate the currant-worm, rose-slug and other pests of the garden.

THOMAS W. FYLES.

GNOPHÆLA VERMICULATA, Grote.

Dear Sir : Last year Mr. Bruce published a description of the larva of this insect, giving the food-plant as *Mertensia virginica* (L.) As Prof. J. B. Smith has repeated this record in CAN. ENT. XXI., p. 174, it becomes especially necessary to point out that it is probably erroneous. In the first place, *M. virginica* is not known to occur in Colorado, and the species known from the Platte basin, in that State, are *M. sibirica*, Don., *M. alpina*, Don., and *M. paniculata*, Don.,—the last a new record, being reported from Denver by Miss A. Eastwood. Secondly, the larva of *G. vermiculata* is common in Custer County from 8,000 to 10,000 feet alt., and is found on *Mertensia sibirica*, although I have rarely found it also on *Echinospermum floribundum*, Lehm. I think, therefore, we may regard *M. sibirica* and *E. floribundum* as the known food-plants of *G. vermiculata*, and throw over *M. virginica* as erroneous, unless Mr. Bruce has anything to say to the contrary. I have elsewhere described the larva and pupa of this insect, and as I have since found the egg, this will be a convenient time to offer a description :—*G. vermiculata :* egg, diam. one mill ; spherical, flattened at base ; pale yellow, smooth, rather shiny. Laid in clusters on leaves of *M. sibirica*. Micawber Mine, Brush Creek, Custer Co., Colo., about 10,000 feet alt., or over. August, 1889. *G. vermiculata* occurs very abundantly in the higher regions of the Arkansas Basin in Colorado, but I have not heard of it on the Pacific slope. It flies lazily by day, visiting especially the flowers of *Senecia* and *Gymnolomia*.

West Cliff, Custer Co., Colo. T. D. A. COCKERELL.

Mailed November 5th.

The Canadian Entomologist.

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PREPARATORY STAGES OF LEPTARCTIA CALIFORNIÆ WALKER, WITH NOTES ON THE GENUS.

BY G. H. FRENCH, CARBONDALE, ILL.

Continued from page 213.

The first to express this belief and put it in a tangible shape before the public was Mr. A. G. Butler, who published a paper in the Ann. Mag. Nat. Hist., based upon a collection of moths made by Lord Walsingham in Oregon. He states he does not hesitate to say that he believes that the different forms do not represent several distinct species, but different forms or varieties of one extremely variable species. The four names that had been used he retains as names of the four forms they were originally intended to represent, and gives in addition four new names. According to Mr. Butler's idea they would stand as follows:

LEPTARCTIA CALIFORNIÆ.

Var. 1, Stretchii, Butler.
" 2, Boisduvalii, Butler.
" 3, Dimidiata, Stretch.
" 4, Latifasciata, Butler.
" 5, Fulvofasciata, Butler.
" 6, Californiæ, Walker (type).
" 7, Decia, Boisduval.
" 8, Lena, Boisduval.

He does not describe these in full, but bases his description on the work of Stretch, Ills., Zyg. and Bomb., using the figures on plate 5.

I have before me representations of all but one of Mr. Butler's varieties in my own collection, and those loaned me by my friend, Mr. W. G. Wright, of San Bernardino, California, and three forms that are not referable to any of his. The second variety, *Boisduvalii*, I have not seen: but it is figured by Stretch. From the series I have, I deduce the following brief descriptions, and from them have had made the wood engravings illustrating the different varieties.

LEPTARCTIA CALIFORNIÆ.

Var. 1, *Stretchii*, Butler (Fig. 12). In this the fore-wings are black, with the zig-zag transverse line pinkish white, a spot of same near the posterior angle and a basal dash. Hind wings black, with a few crimson scales in a transverse row beyond the middle. Under side, fore-wings crimson; a black terminal border, broadest at apex; whitish along the costa. Hind wings black, a little red in the outer part of cell.

FIG. 12.

Two ♂'s from Southern California.

Var. 2, *Boisduvalii*, Butler (Fig. 13). This has the fore-wings black with the transverse band pinkish white, arcuate but not zig-zag, a brief basal dash. Hind wings black with the transverse band, as described by Mr. Stretch, "bright orange red." Described by him from Oregon.

FIG. 13.

Var. 3, *Dimidiata*, Stretch (Fig. 14). Fore-wings black, two whitish spots on the costa and one near posterior angle. In bright examples of this genus three more or less distinct transverse bands may be recognized, usually gray and black with more or less of white blotches in them. The first costal spot here is in band 2 and the other two are in band 3. Hind wings black in my example. Mr. Butler says it may have "a slightly curved series of small ochreous or crimson spots just beyond the middle." Under side, fore-wings black, a broad whitish band from above the cell to posterior angle, and the costal white spot of band 3 repeated. Hind wings slightly flecked with light near the anal angle.

FIG. 14.

One ♂ from Colorado.

Var. 4, *Albifascia*, French (Fig. 15). This has both wings black with a broad white band across the fore-wings. It is the same as *Boisduvalii*, excepting the crimson band on the hind wings. There is no basal dash or other mark on the fore-wings. Under side, fore-wings black to a little beyond the first third, terminal portion black, attenuated

FIG. 15.

to a point at posterior angle; the rest of wing ochreous white. Hind wings black. Body black, a white line from antennæ back over patagia, sides of anterior and middle femora and sides of anterior tibiæ red, as in the other varieties.

One ♂ from California.

Var. 5, *Occidentalis*, French (Fig. 16). Fore-wings black, a whitish basal dash and three blurred whitish spots in bands 2 and 3. Hind wings black, marked with orange as shown in the figure. Under side, fore-wings orange, a narrow terminal black border, black along the posterior margin, veins narrowly black. Hind wings black with an orange terminal and subterminal band, both united by a broad ray that passes through the cell to outer margin. Stripe on side of abdomen orange.

FIG. 16.

One ♀ from Northern California.

Var. 6, *Latifasciata*, Butler. (Fig. 17, hind wings with the band *crimson).* Fore-wings black, with three small white spots on bands 2 and 3. Hind wings black, with the median band crimson. My specimen has this band a little more irregular than the figure. Under side, fore-wings with extreme base and terminal third black, the rest crimson, whitish along the edge of the red. Hind wings with the red of the upper surface repeated.

FIG. 17.

One ♂ from Southern California.

FIG. 18.

Var. 7, *Fulvofasciata*, Butler. (Fig. 17, hind wings with the band *yellow).* This is the counterpart of Var. 6, except that the band of the hind wings is pale yellow instead of crimson. My examples show a tendency to a fine pale ray or two from the base of the hind wings towards the yellow bands, while Mr. Wright's specimen does not show this tendency.

Three ♂'s, two from Truckee, Cal., the other from California, but part of State not indicated.

Var. 8, *Californiæ*, Walker (Typical). (Fig. 18, the light parts of

hind wings *yellow*. Fig. 19 shows the under side). Fore wings black, sprinkled with gray scales so as to give a gray cast to the wing ; the three transverse-bands distinct ; black, with numerous whitish spots ; a basal whitish dash. Hind wings, with the light parts pale yellow. In some the central black band is broken, and in others wanting, only the two black rays and terminal border being present. Under side as in the figure, the yellow pale, and streaked a little at base with red.

FIG. 19.

Ten ♂'s from Truckee, one ♂ from Southern California.

Var. 9, *Wrightii*, French. (Fig. 18, the light parts of hind wings-*crimson*. Fig. 19 shows under side). This is like Var. 8, except that the light parts of hind wings are crimson instead of yellow, and the fore wings are less gray tinted. The fore-wings have, instead of numerous white spots in the bands, one at posterior angle and two on costa, with the basal dash. The under surface is shown at fig. 19, and is crimson instead of yellow.

FIG. 20.

One ♂ from Southern California.

Var. 10, *Decia*, Boisduval. (Fig. 20, hind wings *crimson ;* under side shown in fig. 21). Fore-wings black, the bands more or less marked by whitish spots ; basal dash present. Hind wings crimson, a terminal black border, more or less broken. Under side crimson with terminal black border as in fig. 21, or a few intergrades between this and Var. 9, with a transverse band, as shown in fig. 19.

FIG. 21.

Nine ♂'s and one ♀ with three ♂ intergrades with *Wrightii*, and three ♂ intergrades with *Latifasciata*, all from California.

Var. 11, *Lena*, Boisduval. (Fig. 20, the hind wings *yellow ;* the under side shown in fig. 21. Fig. 22 shows an extremely light form). Fore-wings black, tinged with gray ; the three transverse bands more or less distinct, both by the clear black without gray, and by the whitish spots. In three specimens from Colorado the bands are almost continuous white,

FIG. 22.

as shown in fig. 22. Hind wings yellow, with a terminal black border; sometimes much broken, as in fig. 22. Under side in fig. 21, the light part yellow, more or less red stained at base.

One ♂ from Southern California, three ♂'s from Colorado, two ♀'s from Truckee, Cal., and five ♀'s from other parts of California. Besides this there are two ♀ intergrades with *Decia* from Colorado, four ♀ intergrades with *Decia* from Truckee, Cal., and two ♂'s and one ♀ intergrade with *Decia* from Southern California.

One of the principal variations in these forms is found in the amount of black on the hind wings, ranging from wholly black to a few black spots as a terminal border. The first breaking up of the solid black is found in a single light point near anal angle, then a few pale scales across the wing, next a band of light, in the succeeding stage the basal part invaded by pale rays, and finally all the black obliterate except the terminal border. In the specimens having only the terminal border of black, there is a fine penciling of black along the veins, and in the intergrades between *Wrightii* and *Decia* a gradual fading out of both the transverse band and rays may be found till there is nothing but the obliterate penciling of the veins left. Variety 5, *Occidentalis*, seems to be an irregular form that only partially falls within the line of the regular variation. The fore-wings are black in the red forms, with but little if any gray tint; in the yellow forms, slightly gray tinted, with three more or less distinct transverse bands, which in the gray wings lack the gray tint, and contain in nearly all of them a few white or whitish spots. When only a few spots are present, these are costal in second and third band, and one at posterior angle in third band. Varieties 1, 2 and 4 seem to come from an unusal development of the second band.

The varieties are largely local. The prevailing color of Southern California examples, as seen by the localities under the several varieties, is crimson; the Sierra Nevada and Colorado forms are mostly yellow, and the Oregon and North California forms are orange. These are the prevailing colors. In the Truckee specimens all my males were yellow and females varying from almost a distinctive orange to yellow, with traces of the red tinge along the veins (of hind wings, of course). In Lord Walsingham's collection from Oregon the prevailing color was orange, and we find that color extending into California. But in each of

these localities there is enough intergrading in color to show the affinity of the different forms.

NOTE.—Varieties 4, 5 and 9 are in the cabinet of Mr. W. G. Wright, of San Bernardino, Cal. I think 4 and 5 were obtained by him from Mr. James Behrens, of San Francisco, and probably both were from Northern California.

THE NOCTUIDÆ OF NORTH AMERICA AND EUROPE COMPARED.

(Fourth Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Tribe *Arzamini.*

The pale or yellow coloured species of *Gortyna*, the caterpillars being internal feeders, pupating, however, in the ground, prepare us for the *Nonagriini.* We have, however, in North America, a peculiar tribe which I have called *Arzamini*, and which I here interpolate. The caterpillar was first discovered by Prof. Comstock, in Florida Lakes, in the leaf-stalks of the pond lily. This was the larva of *A. vulnifica* var. *melanopyga*, and subsequently in the lake at Ithaca, the larva of the typical *vulnifica* was observed by the same distinguished entomologist. The larva is furnished with nine pairs of spiracles, and passes freely on the water from one leaf to another. Subsequently, the larva of *Sphida obliquata* was described by Prof. Kellicott. The moths of this tribe are related to the Nonagrians, but differ by the bluntly terminating abdomen of the female, recalling certain *Lachneinæ* in appearance. There are two genera: *Arzama*, with three distinct species (of which I owed specimens of *A. diffusa* to my excellent friend Mr. Moffat) in which the front is smooth, and *Sphida*, with the single species *obliquata*, in which the front is tuberculate. This appears not to be a variable or sexual character in the moths, as it may be in certain *Scarabeidæ*, but is in Lederer's opinion, with which I agree, of generic value. If we are not so to consider the tibial armature, or the conformation of the clypeus in the *Noctuidæ*, there remain few characters which we may use as generic. I am disposed to consider, then, *Copimamestra*, which differs from *Mamestra* by the tibial

claw and *Sphida*, which differs from *Arzama* by the clypeal tubercle, as independent genera on the strength of these single characters. The tribe *Arzamini* is not represented in Europe, and, beyond the *Dicopini*, is so far the first distinct structural departure in North America from the European types. While *Dicopis* and allies resemble the *Bombycoidi* or certain *Hadenini* in appearance, the *Arzamini* have a distinct and singular form, and, while their affinities evidently lie with the Nonagrians, their peculiar larval structure and habit clearly warrants our considering them as constituting a distinct group or tribe of the *Noctuidæ*. The resemblance in the female abdomen of the *Arzamini* to the Bombycid genus *Eriogaster*, and the unusual larval condition, lends interest to this tribe. May we not consider the *Arzamini* as an American survival of a very ancient form of the *Noctuidæ* ?

Tribe *Nonagriini.*

This tribe differs from the *Hadenini* in the absence of body tuftings, and in the finer, smoother vestiture ; only in a few genera is there a median thoracic ridge. In these characters *Gortyna* agrees with the *Hadenini ;* the habit of the larva probably associates *Euthisanotia*, a tropical genus with foot-hold in Florida, with *Gortyna*. The present tribe is one of the most interesting of the family. The moths are pale or straw-coloured, some with a warmer, a little red or ochre tint, and the larvæ feed in reeds or grass. *Nonagria* has a stout, clypeal projection, and naked eyes ; the larva lives in the stems of *Typha* and *Phragmites*, pupating in its burrow. We have eight North American species described ; probably many more remain to be discovered, as the moths must be bred, and are not often captured. In Europe, seven are known. So far as known to me, our species are not like the European, or representative. We have an immense species, with the proportions of a small *Sphinx*, from Florida, my *N. permagna*. Our most usual species, perhaps, in the east, of moderate size, is my *subflava*. No species are known to me from California, but we must expect that they await discovery. These *Noctuidæ*, with boring larvæ, inhabiting swamps, must be an old form of the family, once, at least, of very general distribution. The European genus *Coenobia*, with one species, I have not found in North America, but I discovered a Western American genus *Fota*, with two small species, which, from its clypeal

structure and other characters, seems to belong here. I have described one American species of *Senta*, figured in the Buffalo Bulletin (1874); the figures on this plate are in some copies coloured. Of the European genus *Tapinostola*, two North American species are described, one only have I seen. The European genera *Meliana* and *Calamia*, with single species, are apparently wanting in North America; but we have a peculiar genus in *Ommatostola*, with lashed eyes. *Heliophila* Hüb. (= *Leucania* Ochs.) is, perhaps, the leading genus of the group; and, like *Apatela*, *Agrotis*, *Hadena* and *Mamestra*, contains identical and representative species. The eyes are hairy, the thorax smooth, the male antennæ impectinate, the body rather stout, the legs in some species thickly haired. Probably a resemblance of ornamentation between *Pseudolimacodes niveicostatus* and the European *Heliophila conigera*, led Guenèe, although the eyes in the former are naked (but Guenèe does not study this character), to describe our species, which I am disposed to refer even to a different sub-family, as belonging to *Leucania*. We have probably one identical species of *Heliophila* with Europe: *H. pallens*. Our *H. pseudargyria* seems to be allied to *lithargyria*, while we have a number of species resembling the European *obsoleta*, *straminea*. *comma*, *littoralis*, etc. No species have yet been found in North America at all resembling the European *evidens*, *conigera*, *vitellina*, *turca*. The well-known "Army Worm" *Heliophila unipuncta*, has been taken in England, and in the Madeira Islands, probably introduced from North America. Although single species may have now a wider range, I think we must conclude that the genus *Heliophila*, in North America, belongs to the European element, and is descended from a former common circumpolar fauna. These insects must be collected at light in the neighborhood of swamps and waters by which reeds and flags grow. In the stems of these we may find, in June and July, the grown caterpillars or pupæ of *Nonagria*. The European genera *Mycteroplus*, *Argyrospila*, *Mythimna*, with single or few species, are undescribed in our fauna. It seems probable that our Nonagrians are quite incompletely known, and that in North America, from which twenty-seven species of *Heliophila* are described, while Europe numbers thirty-two, many interesting discoveries await the entomologist in the present group. I have referred here the Californian genus *Zosteropoda*, from the shape of the wings and the tufted legs; and, as in other tribes,

North America is already credited with peculiar genera, with few species, clustering about the two principal genera, which are here : *Nonagria* and *Heliophila.*

Tribe *Scolecampini.*

The body is slender, smoothly haired ; the legs unarmed, thinly scaled, rather long ; the wings vary from rather broad to quite narrow ; the colors are mainly of the preceding group, and the caterpillar of *Scolecocampa* is said to burrow in wood. This tribe, with the *Arzamini*, is exclusively American, and may be considered, equally with that, to be an outgrowth of the Nonagrians. I refer here (see CAN. ENT. XV., 131) the genera *Scolecocampa*, *Eucalyptera*, *Amolita*, *Cilla*, *Doryodes*, *Phiprosopus.* Geyer's figure of *S. liburna* has the primaries shaded with red, a feature I have noticed in fresh Southern examples of the moth. Mr. Morrison seems to have had no notion of the affinities of his *Eucalyptera bipuncta ;* I referred the moth to *Scolecocampa*, the differences seeming only comparative, or of specific value. Since then I found a second Western form, and, although the differences are not very decided, I adopt the genus. In this tribe the ornamentation seems a modification of the usual Heliophilid type. The longitudinal medium stripe, the pale oblique shade to the still pointed primaries, the dots and dotted stigmata, varying in expression in the different genera, are Heliophilid features ; while the oblique and longer palpi, often smoky on the sides, the slender feet and linean body distinguish the tribe. *Doryodes* is described as a Geometrid by Guenèe, and *Phiprosopus* (printed *Phyprosopus*, originally in error) is described, under characteristics which do not belong to the genus and were accidental in the type, equally as a Geometrid by Zeller, who subsequently acknowledged my prior and more correct reference of *P. callitrichoides* to the *Noctuidæ.* The chiloform appearance of most of the genera becomes almost lost in *Phiprosopus*, notwithstanding the narrow wings, while the labial palpi depart from the usual form ; these latter, and the peculiar color, remind one of certain exotic genera allied to *Calpe*, where I was at first disposed to locate the genus. When the immature stages are known, our present views may be modified. Always must our classifications be judged by their reasonableness in reference to the existing knowledge of the whole history of the insects.

Tribe *Caradrini.*

In this tribe, in which the body is still smoothly scaled, or with very slight tufts, the eyes naked, the tibiæ unarmed, the two principal European genera are represented in North America. In *Caradrina*, twenty-eight European species are described, while but eleven have so far been discovered in North America. Of these, *Miranda* seems to be exceedingly near the rare and local European *lepigone*, while others have the European facies. The species of *Pyrophila (=Amphipyra)* are interesting as affording one identical species, *tragopogonis*, and one representative, *pyramidoides*. Whether the former is a survival or an importation is uncertain, I have been inclined to believe the latter is the case. The species of *Pyrophila* are large and so exceedingly like the flat species of *Agrotis*, that (when in the south away fro m my microscope) I mistook *tragopogonis*, communicated to me by Prof. Saunders as injurious to grape, for an *Agrotis*. The unarmed legs separate the present genus; but the habit is similar, as I have observed *pyramidoides* beneath the bark of decaying trees in the woods. Upon the loose bark being removed the moths endeavored to escape by running. Li ke cockroaches, the smooth greasy-looking vestiture, and the flat shape, evidently facilitate their movements in such places of concealment; I have observed species of *Agrotis saucia*, etc., in their company. The question of whether we should not bring in the *Agrotini*, between the *Caradrini* and the *Orthosini*, is yet, perhaps, an open one. No reasons are given by Lederer for not following the arrangement of older authors; but it is better to conform in such cases to Lederer's example, as it is followed in Europe, and since my main object has been always to bring the two faunæ under the same artificial system, so that they can be compared, the differences and resemblances taken note of. In the present tribe the derivation of one part of our fauna is very clear. The European *pyramided*, and our *pyramidoides*, are descended from one stock. We have apparently failed to take over the other large and showy species of *Pyrophila* found in Europe, as I have seen nothing like them in any North American collection. In the west is found my *Fotella notalis*, a moth apparently allied to *Acosmetia*; this latter, with the other European Caradrinid genera, I have not recognized in North America. I am uncertain as to whether *Adipsophanes* and *Crambodes* should not be included in this tribe; the former genus includes my *miscellus* and *terminellus*, the latter Guenèe's *talidiformis*.

THE NORTH AMERICAN CALLIMORPHAS.

A REPLY TO CRITICS.

BY H. H. LYMAN, MONTREAL.

Since my article on the North American *Callimorphas* appeared in the CANADIAN ENTOMOLOGIST for October, 1887, a number of papers upon the same subject, and containing certain criticisms of my views, appeared in subsequent numbers of this magazine, and in Entomologica Americana; and, in addition, I received certain letters upon the same subject from entomologists to whom I had sent copies of my article. To these critics I now propose to make a perhaps rather tardy reply :—

Mr. J. B. Smith had spoken before the Entomological Club of the A. A. A. S. upon this subject, and the discussion had been reported in Entomologica Americana, but, as Mr. Smith surmised, I had not seen the report till after my paper was in the hands of the printer; and, although Mr. Smith's paper in the Proceedings of the National Museum appeared before mine, I did not hear of its issue till after the publication of my own. In the CANADIAN ENTOMOLOGIST for December, 1887, appeared Mr. Smith's review of my paper, in which he admitted the correctness of my determination of the true *Lecontei* of Boisduval, and of many of my contentions, though expressing his dissent from others, especially in the matter of nomenclature. There was, however, one typographical error of some importance in that paper, on page 236, line 27, where the figures 6 and 8 should have been 4 and 6. In that paper, Mr. Smith arranged the species of this genus in a slightly different order from that adopted by me, by changing the order of the two forms *Confusa* and *Suffusa*.

This is a small matter, and one about which I am not disposed to quarrel, especially as it seems to me that no linear arrangement of species can ever be quite satisfactory, as to correctly express the full relationship of species, we should require to group them in all three dimensions of space. But the chief issues between us were whether *Vestalis* should be regarded as a distinct species, or only a synonym of *Fulvicosta*, and as to the correct application of the names *Conscita*, *Lactata*, *Confusa*, *Suffusa* and *Reversa*.

In regard to the first point, Mr. Smith conjectured that I had never seen a true *Vestalis*, and he very kindly sent me a specimen as typical of that form. This specimen is certainly very remarkable, as it is much

smaller than any specimen of *Fulvicosta* that I ever saw, measuring only 38½ mm. in expanse, and is, as Mr. Smith says, "whiter and more frail and *Euchætes* like," though it has none of the semi-diaphanous appearance of *E. Collaris*. It is, of course, impossible to form a safe judgment upon a single specimen, and I can only say, that if a full series should show constant differences from *Fulvicosta*, and no connecting links be found, I should be inclined to concede the distinctness of this form.

This is one of those cases where it is much easier to see a difference than to describe it. Dr. Packard, however, who described *Vestalis*, wrote to me that he now considered his types to be only small specimens of *Fulvicosta*.

Mr. Smith advanced the opinion that this was the form given by Walker as *Conscita* ♀ instead of *Fulvicosta* as generally supposed; but as I regarded this as extremely improbable, I took a life-size photograph of my specimen and sent it to Mr. A. G. Butler, who wrote: "The small form is unknown to me, though I have seen an example of *Euchætes collaris*, under the name of *vestalis*." Mr. Smith also disagreed with me in regard to my citing his name *Lactata* as a synonym of *Conscita* Walk., and argued that *Conscita* ♂ = *Lactata* Smith, *Conscita* ♂ var. b. = *Fulvicosta* Clem. and *Conscita* ♀ = *Vestalis*, and argued that such confusion should militate against Walker's name being retained.

Mr. Walker's errors were no doubt great, especially his placing *Conscita* in a wrong genus; but from what Mr. Butler wrote in reference to the small *Vestalis*, I do not believe that Walker had that form before him at all. His only mistake, after the generic one, was in taking *Fulvicosta*, which had already been described by Clemens, to be the ♀ of *Conscita*, and this, apart from the creation of a partial synonym, was not so very dreadful, seeing that such a relationship would only imply a sexual variation similar to that between the ♂ and ♀ of *Leucarctia Acræa*. I, therefore, maintain my position as to the validity of Walker's name for this form, whether it be a species or only a variety, and in this I am supported by Mr. Butler, who wrote to me as follows: "There can be no question that if *conscita* is a good species (which I do not believe it to be), the first and larger part of Walker's description applies to it, and the mere fact of his referring the wrong female to it will not invalidate that description any more than if Walker had described the male only. Smith's name has not a leg to stand on." Mr. Smith further urged that I was not consistent, and that if his name *Lactata* fell before *Conscita* Walk., my name *Confusa* would

have to give way to *Reversa* Stretch, and added, "I scarcely expect Mr. Lyman's adhesion to this theory." Probably not, but certainly not from the idea which he would seem to imply, as I trust I am not so petty as to allow any desire to have my own name stand, to warp my judgment as to what would be right in the premises.

Mr. Smith claimed that Mr. Stretch's name *Reversa* included *Confusa* as well as *Suffusa* and *Contigua*. I doubt this very much, but let it be assumed that it did, what follows? This is Mr. Smith's reasoning; *Contigua* had priority for one part of Stretch's description, "I separated *suffusa*, and the name stands for the remaining part, viz., *confusa* Lyman, which would remain only as a synonym of *reversa*." This I consider, and I trust Mr. Smith will forgive me for saying it, absolute nonsense, though unlike Mr. Smith's friend at the New York meeting, without any profane adjective.

What Mr. Smith did subsequently to Mr. Stretch's description could hardly affect the application of that name unless he had pointed out that the name *Reversa* covered several distinct species, and proposed that it should be limited to one of them, and then proceeded to give a new name to any other undescribed form.

Mr. Smith did not do this, and naturally so, as he thought, the name *Reversa* included *Contigua*, *Lecontei*, and the form which he undertook to describe as *Suffusa*. He thus proceeded to give a new name to what he considered the only previously undescribed species included by Mr. Stretch in his description. Certainly the greater part of the description of *Reversa* applies to *Suffusa;* Mr. Stretch, especially, saying that the markings "are exactly as in *Clymene*," and Mr. Smith, himself, acknowledged this to me. I, therefore, think that if the name *Reversa* is to stand, it must be for *Suffusa*, and not for the form which may possibly have been referred to in the following bracketed eight words of a sixteen line description: "The basal patch is triangular, (sometimes divided by a narrow, basal brown brand)."

I think, however, that as the first half of the description was evidently intended to cover *Contigua*, which Mr. Stretch appears to have considered the stem form, the name should be ignored, except as a synonym, and Mr. Butler wrote that he agreed with me on this point. Mr. Grote, on the contrary, wrote that *Reversa* should stand with *Suffusa* as a synonym.

Mr. Butler found fault with both Mr. Smith and me for using the

name *Callimorpha* for these moths, writing as follows:—"I have strongly objected to the use of this generic name for this group on the following grounds, viz.:—1. The type of *Callimorpha* is *C. jacobææ*, a European *Lithosiid.* 2. There is already a generic name—*Haploa* Hübn.—for the North American representatives of *Hypercompa.* I have pointed out to Smith that there are structural differences between *Hypercompa* and *Haploa*, and although these characters are slight in themselves, I am of the opinion that, taken in conjunction with the utterly different aspect and style of coloration of the species, they should be regarded as sufficient."

Mr. Smith, it will be remembered, in his paper in the Proc. Nat. Museum, '87, 23, held that these "structural differences" were too slight to warrant such a separation, and affirmed, besides, that they were not constant, and for myself I may say, as I wrote to Mr. Butler, that I am not in a position to decide the question satisfactorily, even to myself, and so prefer to leave it to the authorities.

Mr. Grote, in two short communications to the CANADIAN ENTOMOLOGIST, while complimenting me on my plate and on my sorting out of the moths, insisted that my work was not original, and that these forms could not be regarded as distinct until they have been proved so by breeding from the egg.

I am not greatly concerned as to whether my humble work in this department is "original" or not. I contend that it is at least useful, but if the description of a form as a new species is not original, what is to be said of Mr. Grote's own work in the same direction? As to the argument about breeding from the egg, which has also been urged in letters by others, I repudiate it as unscientific and impracticable. If no one was to be permitted to describe a species as new until he had proved it to be such by breeding from the egg, there would long ago have been a complete block in the study of North American entomology, and there would not have been so many specific designations followed by the honoured name of Mr. Grote. Besides, it is not such a long time since a very distinguished entomologist described as a new species a form which he had "established on a sure foundation by breeding from the egg," and which shortly afterwards turned out, upon further breeding, to be only a previously named form of a well known polymorphic species. It is, therefore, difficult to say how much breeding would have to be done before these doubting Thomases could be convinced. I may say, however, that

I held back my paper for several years in the hope of being able to breed the two forms, *Lecontei* and *Confusa*, side by side, but the appearance of such a muddle as the description of *Reversa* Stretch decided me to publish the results of my studies, so far as they had gone, with as little delay as possible.

Dr. Packard wrote that he could not believe in the distinctness of these species, and that Mr. Otto Seifert had bred a good many forms and considered them varieties of *Lecontei*. I immediately wrote to Mr. Seifert to ask for particulars of this most important information, and received an answer in which he said:—"Dr. Packard must have misunderstood me in saying I reared those *Callimorphas*. Showing the doctor quite a number of this insect in great variety I told him they had been caught (by Mr. Putnam Cramer) near Troy, N. Y., in July, all at the same spot." Finally, Dr. Lintner wrote very guardedly that *C. contigua* at least seemed distinct.

It would thus seem that these unfortunate moths, having got the reputation of all belonging to one species, it is impossible to get people to accept the idea that they may really be distinct species, although they are quite ready to accept as such any apparently new form of such difficult genera as *Colias*, *Argynnis* or *Catocala*, even when the difference is so slight as to be hardly perceptible.

I consider the *Callimorphas* far more distinct and more easily separated than the species of very many genera of butterflies and moths which could be named in addition to those referred to above. I have seen in all at least two hundred specimens, and until very recently and since the publication of my paper, I had never seen one that I could not unhesitatingly place at sight. The exception was in the case of a few specimens in the collection of Dr. Bethune, which seemed to indicate a possible linking of the two forms, *Confusa* and *Suffusa*, and I am prepared to admit that possibly these two forms may turn out to be northern and southern varieties of one species, though Mr. Smith disagrees with me strongly on this point.

I hold, however, very strongly with Mr. W. H. Edwards that whenever a form is distinctly and easily separable from previously named species, it is entitled to be treated as a good species, and to be given a specific name until it is proved to be only a variety by breeding, and that in such a case the name should be retained as a varietal name; but with regard to this breeding from the egg, I would point out that the making of these

experiments is just as incumbent upon those who deny as upon those who assert the validity of these specific distinctions.

For myself, I care very little whether entomologists acknowledge that these moths belong to distinct species or not, if they will only regard them as distinct forms or varieties. No good can possibly come from lumping such forms as *Lecontei*, *Contigua*, *Confusa*, *Suffusa* and *Fulvicosta* under one name. Let these names be used if only as varietal names, in order that we may know what writers on the subject refer to, and learn something of the distribution of these interesting forms. If this is done, and those who have the opportunity and time will breed them and publish the results of their experiments, I shall be quite content, and shall have no fear of the correctness of my views being disproved, but even if the results should controvert my belief, I shall be quite satisfied so long as the truth is established.

NOTE ON THE PREDATORY HABITS OF CHÆTOPSIS ÆNEA (WIED).

REV. THOMAS W. FYLES, SOUTH QUEBEC.

In the beginning of July last I discovered in a bed of *Typha latifolia*, in the neighborhood of Montreal, a large number of the larvæ of *Arzama obliquata*. I have visited the spot repeatedly, and have had the larvæ under daily observation. One remarkable circumstance concerning them is that they are liable to attacks from the maggots of a fly belonging to the Ortalidæ, viz.:—The *Chætopsis ænea* of Wiedeman, the *Ortalis trifasciata* of Say. I found that larvæ, in the proportion of about one in every six, had been overcome by these maggots. Some of the victims were quite dead; some were still writhing. As many as twenty maggots were feeding on one caterpillar, draining away its juices. They were of the usual form, pointed at one end and truncated at the other. When mature, their length was about seven-sixteenths of an inch. I raised a great number of them, feeding them upon injured *obliquata* larvæ. The pupal stage lasted about ten days; and all through August the flies continued to make their appearance. They are very beautiful. The head is white; the eyes are dark brown; the body is green and glossy; and the legs, antennæ and mouth-organs are brownish yellow. The wings are whitish and hyaline; they have black tips and two transverse black bars, the hinder of which touches the black tips at the costal edge. I am indebted to Dr. Hagen for the identification of the species.

PREPARATORY STAGES OF PYRAMEIS CARYE, HÜBNER.

BY HARRISON G. DYAR.

The eggs are deposited by the butterflies, singly, on the upper surface of the leaves of the food-plant, the Malva. They are nearly cylindrical, but thicker in the middle, the base and top quite flat, and rather abruptly rounded. The longitudinal ribs project beyond the summit; color green, of a slightly bluer tint that the leaves. Length 7 mm.

FIRST LARVAL STAGE.—Head, cervical spot, anal plates, and alternating row of eight black dots per segment and short hairs, all black. Body dark yellowish. Head without processes, smooth and shiny. The caterpillar spins a web on the surface of the leaf, beneath which it lives and eats the upper portions of the leaf. Length about 2 mm.

SECOND LARVAL STAGE.—Head black and hairy. Body pale purplish black; short spines bearing black hairs, arranged as in the mature larva, black, but the dorsal and sub-dorsal on joints six, eight and ten, yellow. Length 4 mm.

THIRD LARVAL STAGE.—As in the preceding stage, but the sides faintly mottled with yellow, and a geminate yellow dorsal stripe. Length 8 mm.

FOURTH LARVAL STAGE.—Head slightly cordate, bronzy black, with minute, yellow speckles and black hairs. Body purplish black, with small yellow spots, a geminate dorsal yellow line, irregular and interrupted, and a series of irregular supra-stigmatal and sub-stigmated spots. Spines black. Length about 15 mm.

FIFTH LARVAL STAGE.—Mature larva. Quite variable in appearance, but the markings are essentially the same. Head black, covered with many white hairs, and on the vertex about six orange elevated spots bearing black hairs. Body dull greenish and black mottled, varying in intensity of shade from black, through gray, to a dull dirty white, but usually light colored, thus distinguished from its ally, *Pyrameis cardui*. On the body are many orange or yellow spots, appearing to be irregularly placed, but they may be arranged as follows:—A row in sub-dorsal space, three contiguous lateral rows (in one example in which the spots were yellow, the central lateral row was orange), and a supra-stigmatal and sub-stigmatal row, all irregular. Spines black or white, or, in some, the anterior ones black, branched, and each tipped by a black hair. The spines are seven per segment on joints five to twelve (*i. e.*, dorsal, sub-dorsal, lateral and sub-stigmatal), none on joint two, four on joints three

and four, and two on joint thirteen. The body is covered by many small elevated spots producing short white hairs. Venter greenish, mottled with black or brown. Length about 30 mm.

CHRYSALIS suspended by the cremaster, depressed behind the thorax, the thoracic process short and pointed, tapering anteriorly in a ridge, wing cases prominent, abdominal segments small and quickly rounded, cremaster flattened and hooked to the button of white silk, a pointed elevation at each eye, and at the base of the wing cases. Three rows of dorsal pointed elevations on the abdominal segments with two points on the thorax, touched with white, and two large and two small white spots in the depression behind the thorax. Color of chrysalis wood brown, minutely mottled with whitish or darker to black. The caterpillar forms itself a hollow in which it lives, by spinning up one or more leaves of the food-plant. The length of each stage is about four days, and the pupa state lasts about two weeks. In its early stages the insect cannot be distinguished from *Pyrameis cardui.*

Larvæ from Los Angeles Co., California.

BUTTERFLIES AT QU'APPELLE, ASSA.

BY HENRY SKINNER, M. D., PHILADELPHIA.

The following is a list of butterflies caught near Fort Qu'Appelle, Northwest Terr., by Mrs. Cora E. Rose and her two little sons. Mrs. Rose describes the locality as follows :—"Those sent were all caught within a radius of about half a mile, in the territory of Assiniboia, thirty miles north of an old Hudson Bay Post called Fort Qu'Appelle, and distant west from Winnipeg some three hundred and twenty-five miles ; the only foliage is willow and poplar."

Papilo rutulus, Bdl.

Pieris protodice, Bdl.

Colias christina, Edws. A number of males and one female, the orange form.

Colias philodice, Godt.

Colias Scudderii, Reak.

Colias eurytheme, Bdl. A number of fine males and one female.

Lycena Scudderii, Edws. Male and female.

Chrysophanus helloides, Bdl. Male and female.

Chrysophanus florus, Edws. Male and female.

Danais plexippus, Linn. One very peculiar looking male expanding only three and one-half inches and having the primaries produced apically in a remarkable manner.

Euptoieta clandia, Cram. This has previously been reported from N. W. Terr. by Geddes; all the books give it a much more southern range, Strecker giving it from Pennsylvania southward and Edwards's northernmost points being Quebec and California.

Argynnis lais, Edws.

Argynnis bellona, Fabr.

Melitea carlota, Reak.

Grapta progne, Cram.

Vanessa milberti, Godt.

Vanessa antiopa, Linn. The expanse is considerably less than in those found here (Phila.)

Pyrameis cardui, Linn.

Pyrameis huntera, Fabr.

Limenitis arthemis, Drury.

Erebia discoidalis, Kirby.

Erebia sine-ocellata, Nov. var.

This is a var. of *epipsodea*, Butler, which, I think, deserves characterization. It has the bright fulvous patch on the superior wings divided into four sections by the sub-costal and discoidal nervules. Above the third median nervure is a small fulvous patch separated from the rest. There are but two black dots on the fulvous, and the white dots, which in *epipsodea* make them ocelli, are wanting. The underside of the superior wings is practically the same as the upper. Described from two specimens, one from Fort Qu'Appelle and the other in the Coll. Am. Ent. Soc., locality unknown. The Fort Qu'Appelle specimen is very much darker than *epipsodea* usually is. *Epipsodea* is quite a variable species, individuals differing in the size, colour and number of the ocelli, also in the extent and number of the fulvous patches. One marked specimen having four white pupilled ocelli.

Chionobas varuna, Edws.

Satyrus, var. *boopis*, Behr.

Satyrus, form *olympus*, Edws. Three specimens. They do not agree entirely with *olympus*, but I did not think they deserved a new name.

Cœnonympha typhon, Rott. If this is not a variety of the European form it is most likely a new species. Two examples only.

Pamphila Manitoba, Scud.

Pamphila cernes, Bdl.-Lec.

Thymelicus garita, Reak.

Nisoniades icelus, Lint.

CORRESPONDENCE.

A RARE MOTH.

Dear Sir: Allow me to record the capture, in Canada, of the rare moth *Thysania (Erebus) Zenobia*, Cramer.

On the evening of Aug. 20th, 1888, while sugaring for Catocala in the woods near this village, I came upon the strange visitor. He was sitting, with wings spread, sipping my bait, and was evidently more at ease than I. The sensation which a hunter is said to experience on sighting his first deer came upon me, for I was unprepared for such an encounter. However, the monster was taken.

By a careful comparison of my specimen with the descriptions and with Drury's figure of T. Zenobia, and by submitting it to three different Entomologists of eminence, all of whom concur in my opinion, I have placed its identity beyond a doubt.

The only reference, as far as I can find, heretofore published of its occurrence in North America is in the following foot-note in Prof. Grote's Check List of Noctuidæ North of Mexico, P. II., page 43 (1876), viz.:— "Professor Riley informs me that this species occurred at Davenport."

In Vol. XVIII., page 236, of this Journal, Prof. Grote mentions Thysania Zenobia as one of the "species which are probably summer birds of passage from the West Indies and South America, following the Gulf Stream, or aided by prevailing winds."

Drury gives Jamaica as its habitat.

It is hard to believe that so frail a creature as an insect, though strong in flight, could have flown two thousand miles, but the ragged condition of the margins of the primaries in my insect, while all the other parts are apparently quite fresh, is evidence of its having fanned many miles of atmosphere.

A. H. Kilman, Ridgeway, Ont.

Mailed December 7th.

INDEX TO VOLUME XXI.

Aaron, E. M., articles by, 126, 145.
Aleutian Islands, new species of Tineidæ from, 27.
American Lackey Moth, 74.
Annual Meeting Entomological Club A. A. A. S., 131.
Annual Meeting Entomological Society of Ontario, 181.
Ants herding caterpillars, 132.
Apple tree tent caterpillar, 74.
Arctiadæ of temperate North America, preliminary catalogue of, 169, 193, 213.
Arge Galathea, preparatory stages of, 61, 81.
Ashmead, W. H., article by, 37.
Association of Official Economic Entomologists, 166, 219.
Audubon, monument to, 80.

Agasphærops nigra, 33.
Agrotis saucia, 118.
" scandens, 118.
" subgothica, 118.
Aletia argillacea, 22.
Amalopota, n. gen., 176.
" *Uhleri*, n. sp., 178.
Ameria Texana, 161.
Amphipyra pyramidoides, 230.
" tragopogonis, 230.
Amphotis Ulkei, 106.
Ancyloxypha numitor, 160.
Anthocharis genutia, 129.
Apatela felina, 36.
" lepusculina, 36.
Aphodius marginatus, 32.
Arctia achaia, 35.
" Behrii, 35.
" geneura, 162.
" phylira, 60.
" pinorum, 163.
" *Shastaensis*, n. sp., 162.
Argynnis Cybele, 130.
" Idalia, 129.
" Myrina, 130.
Arzama obliquata, 39, 78, 79, 99, 160, 226, 236.
" vulnifica, 226.
Ataenius Wenzeli, 103.

Bethune, C. J. S., articles by, 100, 181.
Beutenmuller, W., articles by, 27, 160.
Bombycidæ, notes on, 28.
Book notice, 100.
Brehme, H. H., article by, 78.
Butterflies at Qu'Appelle, 238.
" captured at Montreal, 120.
" catching, by means of decoys, 110.
" classification of, 205.
" flock of, 38.
" length of life in, 49.
" of Philadelphia, 126, 145.
" of Prairies and Rocky Mountains, 57.
Butterfly, an early, 120.

Bembidium 4-maculatum, 107.
Biotus formicarius, 105.
Blaps similis, 101.
Bledius basalis, 30.
" politus, 30.
Bruchomorpha oculata, 7.

California moths, notes on, 35.
" some moths from, 161.
Callimorphas, the North American, 231.
Carterocephalus mandan, preparatory stages of, 113.
Cerathosia, Mr. Smith on, 37.
Chætopsis aenea, predatory habits of, 236.
Chionobas jutta, further notes on, 12, 67.
Cicindela, notes on, 29, 104.
Citation of localities, 46.
Clarkson F., article by, 28.
Clivina, notes on, 30.
Clothes beetle, a new, 187.
Cockerell, T. D. A., articles by, 20, 46, 60, 140, 220.
Coleoptera, additions to list of Canadian, 108, 134.
Coleoptera, new to Colorado, 20.
" notes on, 29, 101.
Colias Meadii, preparatory stages of, 41.
Cook, A. J., article by, 187.
Corrections and additions to previous papers, Hamilton, 101.
Currant saw-fly, the imported, 150.
Cut-worms, 117.
Calosoma calidum, 119.
Catocala relicta, 122.

Ceratocampa regalis, 101.
Cerostoma Aleutianella, n. sp., 27.
" *dubiosella*, n. sp., 27.
Chionobas, 12, 63, 67.
" Macounii, 160.
" semidea, 67.
Chlænius Pennsylvanicus, 30.
Cicindela lepida, 104.
Clisiocampa Americana, 74.
Cloeotus aphodioides, 104.
Colias Boothii, 60.
" cæsonia, 43.
" " n. var. *rosa*, 45.
" chione, 59.
" eurytheme, 60, 238.
Conosoma pubescens, 107.
Conotrachelus naso, 34.
Cremastochilus Knochii, 106, 140.
Cychrus Lecontei, 30.
Cyphon padi, 108.

Datana major, larva of, 34.
Dawson, P. M., article by, 179.
Denton, S. W., articles by, 38, 110, 164.
Derbidæ, observations on some northern, 156, 176.
Droves of Lycænid caterpillars herded by ants, 132.
Dyar, H. G., articles by, 34, 77, 137, 209, 237.
Dyschirius, notes on, 29.

Danais archippus, 19.
" plexippus, 239.
Dermestes Frischii, 101.
" murinus, 101.
Dicerca prolongata, 105.

Edwards, W. H., articles by, 41, 61, 81.
Elliott, R., article by, 120.
Entomological Club A. A. A. S., meeting of, 131.
Entomological Society of Ontario, meeting of, 181.
Euplexia lucipara, preparatory stages of, 137.

Emphylus Americanus, 106.
Epitragus arundinis, 103.
Erebia epipsodea, 64, 239.
" " n. var., *sine-ocellata*, 239.
" magdalena, 67.
Erebus Zenobia, 240.
Euparia castanea, 106.
Euphoria hirtipes, 106.
Euptoieta Claudia, 239.

Farmers' own insecticide, 220.
Fletcher, J., articles by, 15, 74, 113, 117, 150, 201.
French, G. H., articles by, 25, 35, 161, 210, 221.
Fyles, T. W., articles by, 12, 17, 220, 236.

Geddes, G., articles by, 57, 59.
Gortyna, notes on genus, 139.
Gosse, P. H., death of, 17.
Grote, A. R., articles by, 21, 37, 51, 121, 139, 154, 188, 205, 226.

Glæa inulta, 153.
Gnophaela vermiculata, 174, 220.
Grapta j-album, 148, 164, 179.

Hagen, H. A., articles by, 53, 71.
Hamilton, J., articles by, 29, 101.
Harrington, W. H., articles by, 95, 141.
Hemiptera from Muskoka Lake District, 1.
Howard, L. O., articles by, 13, 59.

Hadena arctica, 118.
Harpalus dichrous, 31.
" vulpeculus, 31.
Harpiphorus varipictus, n. sp., 96.
Hesperia unna, 149.
Hymenorus obscurus, 107.
" rufipes 107.
Hypocoprus formicetorum, 106.

Insecticide, Farmer's own, 220.
Insects injurious to fruits, Saunders, 100.

Ibalia maculipennis, 141.
Icerya Purchasi, 182.
Ips fasciatus, 103.

Johnson, J., article by, 79.

Junonia cænia, 145.

Kellicott, D. S., article by, 39.
Kent Scientific Institute, 80.
Kilman, A. H., articles by, 108, 134, 240.

Larvæ, descriptions of, 34, 41, 61, 77, 113, 137, 160, 164, 179, 209, 210, 237.
Lepidoptera, additions to list of Canadian, 153.
Lepidopterous Faunæ of Europe and North America, 21.
Leptarctia Californiæ, preparatory stages of, 210, 221.
Leptura, notes on, 32, 108.
Lyman, H. H., article by, 231.

Lasioderma serricorne, 187.
Lebia vivida, 30.
Leptarctia Californiæ, 210, 221.
" " n. var. *Albifascia*, 222.
" " var. Boisduvallii, 222.
" " var. Decia, 224.
" " var. Dimidiata, 222.
" " var. Fulvofasciata, 223
" " var. Latifasciata, 223.
" " var. Lena, 224.
" " n. var. *Occidentalis*, 223.
" " var. Stretchii, 222.
" " n. var. *Wrightii*, 224.
Leptura exigua, 33.
" hæmatites, 32, 108.
" nana, 108.
" subargentata, 33.
" zebra, 33.
Ligyrus relictus, 32.
Limacodes inornata, 77.
Limulodes paradoxus, 105.
Lixus concavus, 103.

McNeill, J., article by, 43.
Moffat, J. A., articles by, 19, 60, 99, 153.
Moth, a rare, 240.
Moths from Texas, Arizona and California, 161.
Muskoka Lake District, Hemiptera from, 1
Myrmophile, a new, 140.
Myrmophilous Coleoptera, 105, 140.

Macrobasis unicolor, 103.
Macrophya propinqua, n. sp. 97.
Meligethes aeneus, 107.
Myrmechixenis latridioides, 106.

Noctuidæ of N. America and Europe, 121, 154, 188, 226.
Notes, 79.

Nathalis Iole, 60.
Nematus Erichsonii, 152.
" *ocreatus*, n. sp. 95.
" ribesii, 150.
Neonympha areolatus, 25.
" *Mitchellii*, n. sp., 25.

Ochria, note on genus, 139.

Œneis, 63.
Ortalis trifasciata, 236.
Otiocerus Coquerbertii, 159.
" Degeerii, 159.
" Signoreti, 176.
" Stollii, 159.
" Wolfii, 176.

Popular and Economic Entomology, 15. 74, 117, 150, 201.
Prairies, collecting in the, 57.
Pyrameis Carye, preparatory stages of, 237.

Pamphila Peckius, 147.
Papilio Asterias, n. var. *alunata*, 127.
" Glaucus, 128.
" Philenor, 127.
" Rutulus, 111, 238.
" Turnus, 111, 128, 201.
Phalangodes robusta, 140.
Phymatocera nigra, n. sp., 96.
Piazorhinus pictus, 104.
Pieris Ilaire, 39.
" rapæ, n. var., *immaculata*, 128.
Pityophagus rufipennis, 31.
" verticalis, 31.
Platysamia Cecropia, 28.
Plusia Arizonæ, 161.
" formosa, 124.
" Lenzii, 161.
" thyatiroides, 124.
Pocadius helvolus, 31.
Ptenidium evanescens, 105.
Pterostichus adoxus, 102.
" coracinus, 102.
" femoralis, 102.
" Hamiltoni, 102.
" lachrymosus, 102.
" patruelis, 102.
" tartaricus, 102.
" unicolor, 102.
" vinctus, 102.
Ptinus bimaculatus, 135.

Rhyssematus scaber, habits of, 30.
Rileya, final word about, 37.
" one word more about, 13, 59.

Satyrinæ, notes on certain, 61, 81.
Saunders, insects injurious to fruits, 100.
Scudder, S. H., article by, 49.
Skinner, H., articles by, 126, 145, 238.
Smith, J. B., articles by, 169, 193, 213.
Specific names, 51.
State Entomologist of New Jersey, 79.

Samia Cynthia, 28.
Saperda concolor, 105.
" Fayi, 104.
Soronia Ulkei, 106.
Stenolophus conjunctus, 31.

Tenthredinidæ, n. sp. of Canadian, 95.
Thyatira pudens, larva of, 209.
Tiger Swallow-tail Butterfly, 201.

Tineidæ from the Aleutian Islands, new species of, 27.
Trenholme, E. C., article by, 120.

Tachinus pallipes, 107.
Tachycellus Kirbyi, 31.
Tachyporus brunneus, 107.
" scitulus, 107.
Tarucus theophrastus, 132.
Taxonus rufipes, n. sp., 97.
Tenthredo semicornis, n. sp., 98.
Tenthredopsis Evansii, n. sp., 98.
Thamnotettix eburata, n. sp., 10.
Thysania Zenobia, 40, 240.
Trichopteryx fascicularis, 105.
Trogoderma ornata, 101.

Van Duzee, E. P., articles by, 1, 39, 158, 176.

Winter collecting, 15.
Wylly, Mrs., article by, 132.

Zimmermann, Dr. Christian, memoir of, 53, 71.

ERRATA.—Page 159, line 4 from bottom, for "*Amphixepa*" read "*Ampiscepa*."
" 161, line 21 from bottom, for "Arizona" read "Arizonæ."
" 162, " 7 from top, for "in" read "is."
" 162, " 11 " " " "boat-shaped" read "boot-shaped."
" 162 and 163, for "Genura" read "Geneura" wherever it occurs.
" 178, line 3 from top, for "*Hucita*" read "*Helcita*."
" 182, line 14 from top, for "Mr. Percy Crawford" read "Mr. Frazer S. Crawford."
" 182, line 26 from top, for "Colonel Robins" read "Colonel Dobbins."
" 209, line 4 from bottom, for "Endamus" read "Eudamus."
" 220, line 3 from top, for "*Phytolacca decandra*" read "*Veratrum viride*."

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